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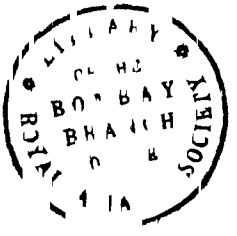
THE NINETEENTH CENTURY SERIES



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DISCOVERIES AND EXPLORATIONS IN THE CENTURY

B1325

BY

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PREFACE.

THE Nineteenth Century has been one of strenuous expansion and of restless activity in the search for geographical knowledge. The records of this expansion and of this activity are unusually full, but at the same time scattered and chaotic. In writing this volume, the object which I have chiefly kept in view has been to afford a clear and comprehensive, yet sufficiently compact, presentation of the progress and results of these activities. I have endeavoured to treat my somewhat cumbrous subject in a manner popular and entertaining; but I have not been willing to sacrifice accuracy in the effort to be picturesque.

The labour of sifting, systematising, and digesting the vast and confused masses of detail bearing upon this subject has been very great, and I dare to hope that the result may be a convenience to many readers. If so, their thanks will be due, with mine, to all those who have generously favoured me with advice and facilitated my acquisition of material,—among whom I must do myself the honour of naming particularly the distinguished scholar, Dr. J. Scott Keltie, Secretary of the Royal Geographical

Society, without whose wise suggestions I should have found myself seriously hampered. I must gratefully acknowledge, also, the courtesy of Mr. James R. Boose, Librarian of the Royal Colonial Institute, and of the authorities of the British Museum Reading-Room.

C. G. D. R.

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DISCOVERIES AND EXPLORATIONS IN THE CENTURY.

PART ONE.

INTRODUCTORY.

CHAPTER I.

BRIEF SURVEY OF EXPLORATION AND DISCOVERY PRIOR TO THE NINETEENTH CENTURY.

Section 1. When the world was young the mysterious lay just beyond the horizon. Now it is entrenched behind sinister ice-floes in the ghostly desolation of the polar seas, or eludes the adventurer among the swamps and mountain fastnesses of certain tropical and sub-tropical regions. Here and there it still finds sanctuary in the midst of human fanaticism. But everywhere the boundaries of its material domain are narrowing before that little band of bronzed and resolute men, of the breed that has always "yearned beyond the sky-line, where the strange roads go down." From generation to gen-

eration their ranks have been recruited from many lands and peoples, but predominantly, it would seem, from the Aryan stock. Whether their underlying motive has been born, as among the Phœnicians, of the needs of commerce, of such military ambition as led the Greeks into Persia, or of the fierce love of freedom which urged the Northmen westward over strange seas to Iceland and Greenland, the men who have led their followers into unknown lands have been men of imagination, potential poets, whose epics are writ large in the characters of cities and of civilisations. They have been dreamers of strenuous temperament, with faith and restless power behind their dreams. And the same is true of those later travellers in uncharted ways, who, with scantier following, have faced all dangers and difficulties at the bidding of science or in the cause of their religion.

The siren voices of unknown lands have found eager hearkeners through all the ages. But back in the vague dawn-light of history the form of the explorer becomes one with that of demi-god and hero. In fact, there is no figure about which the glamour of myth gathers more readily, as instanced in the case of Sindbad the Sailor. Him we picture to ourselves only through the magic atmosphere of the Thousand-and-One Nights. Yet the original Sindbad, the roc's egg and the valley of diamonds notwithstanding, was an actual Arabian traveller, whose voyagings took place as late as the ninth century of the Christian era. By degrees, however,

the need of some systematic record of accurate observations made itself felt. In answer to this need, the science of geography gradually gained in efficiency, until the cool brain of the closet philosopher became a check to the too marvellous narratives of the discoverer.

Section 2. The relation of mathematics to geographical discovery has long been a most intimate and important one. The work of the explorer would be to a great extent futile and inconclusive were it not for certain mathematical principles as applied to navigation and to cartography. The difficulty of the problems before the cartographer was increased by the acceptance, as early as the middle of the third century B.C., of the theory of the earth's sphericity. About this time Eratosthenes was able, by observations with the gnomon, to establish certain lines parallel with the equator. But of all the physical inventions that have affected the history of exploration, the most important is the mariner's compass, which came into use among western nations some time during the fourteenth century. With the advent of the compass the day of the navigator dawned; and in 1480 his needs were further served by the application of the astrolabe to the finding of latitude. In map-making, Mercator's projection dates from the seventeenth century; and in navigation the same century saw the gradual displacement of the astrolabe by the cross-staff, which in turn gave place to the sextant. The task of the cartographer will not

be finished until all the earth's surface has been mapped from exact trigonometrical surveys.

Section 3. In glancing back over the story of exploration and discovery before the beginning of the nineteenth century, it is necessary to touch upon only the greatest figures, and to emphasise only those discoveries which have proved most vitally significant. Among the earliest to add to the recorded knowledge of strange lands were the Phœnicians of Tyre and Carthage, who sent forth their galleys east and west and south, eager for barter and adventure. Their keels were active in the gorgeous trade of the Indian ports, and had pushed far south along the African coast for ladings of gold and ivory and palm oil. These intrepid traders had even found their way westward and north as far as the rich tin mines of the little island destined later to be known to history by the name of England. Important also were the various expeditions of discovery in Persia, in India, and along the African coasts, sent out by Alexander the Great, and later, under the dynasties founded by his generals. The Roman Empire, during its ascendency, must be credited with the accomplishment of rough but comprehensive surveys of much of Europe and of large districts in Asia and in Africa.

Section 4. But the imagination stirs more strongly to the saga-records of the westward voyagings of the Northmen into the mystery and menace of unknown seas. To these fierce rovers belongs the dis-

covery of North America. Colonists and traders as well as vikings, their restless activity found expression along many lines. During the darkest period of the Middle Ages, while their dragon-ships were a terror to Europe, their enterprise in another direction was holding open a commercial route between India and the Baltic. Though their heroic achievements in the vague western world were to prove at last practically barren of results, they yet have interest in imaginative appeal as the first contact of our race with the great continent which it was afterwards to control. The westward movement of the Northmen began with the colonisation of Iceland in the ninth century, and soon spread to the Greenland coast. In 986 A. D. a young viking named Bjorni, sailing to join the Greenland colony, was carried southward out of his course, and sighted unknown shores. One Leif Erikson, aroused by Bjorni's report, presently sailed for these mysterious new lands, whose coasts he skirted southward to a hospitable region which he named Vineland. This was probably either Nova Scotia or the shores of Massachusetts Bay. In Vineland Leif established a village, and his example was followed by a viking named Thorfinn. But this brave beginning of colonisation was destined to flicker soon into extinction. The tall yellow-haired settlers turned eastward again, or fell in battle with the savages, until all traces of their invasion disappeared. In 1418 the parent colony in Greenland

was destroyed by the Esquimaux, and nothing remained to show for the achievements of Bjorni, Leif and Thorfinn save the poetical narrative of their adventures embodied in two Icelandic sagas.

Section 5. For a long time the East held the attention of the explorer, while the West awaited Columbus. The name of Marco Polo is illustrious on the list of travellers of the Middle Ages. Visiting the Orient in 1265, he served for many years as an attendant of honour at the court of Kubla Khan, whose name, for English readers, is chiefly associated with Coleridge's magical and tantalising fragment of verse.* The valuable narrative of Polo's travels was dictated while its author, having returned to Europe lay a prisoner in the hands of the Genoese. Much knowledge of the East was gained, also, during the thirteenth and fourteenth centuries, through the missionary enterprise of the Franciscan monks. These zealous priests found their way into Tartary, Western India, China, Persia, Malabar, Sumatra and Java, and were the first to clear up some doubtful points about the Caspian Sea. One of these missionary explorers, Friar Odoric of Pordenone, was the first European to visit Lhasa, the sacred city of Tibet. While Odoric was in the midst of his

* "In Xanadu did Kubla Khan
A stately pleasure-dome decree,
Where Alph the sacred river ran
Through caverns measureless to man
Down to a sunless sea. . . ."

wanderings, Ibn Batuta, the greatest of Arabian travellers, was beginning his career. Between 1325 and 1353 Batuta carried on extensive explorations in Persia, Asia Minor, China and Africa.* After the death of this illustrious Arab Spain began to send explorers and diplomatists into the East; and later still our knowledge of the Orient was increased by the reports and narratives of several Italian travellers of the fifteenth century.

Section 6. But before this the focus of interest had shifted from the achievements of the land-traveller to those of the navigator. Portugal was easily foremost in the new path opened by the application of the magnetic needle to purposes of navigation. Portugal's most significant figure at this time was Prince Henry the Navigator, who gave up the pleasures of his court to devote himself to the promotion of geographical discovery. His ambition was to find a sea-route to the treasure-houses of Arabia and India. He established himself upon the rugged promontory of Sagres, where he founded his famous school of navigation and devoted all his energies to the advancement of knowledge along his chosen lines. At this time Cape Nun marked the limit of southward exploration upon the west coast of Africa. Having determined upon the conquest of Guinea, he sent a number of small annual expeditions to ex-

* A French translation of Ibn Batuta's works was published in 1857 under the auspices of the Asiatic Society of Paris.

amine beyond this point. Not until 1445, however, did one of his captains push his way as far as the mouth of the Senegal. Ten years later a young Venetian adventurer in the Prince's service led his ships as far south as the Gambia. The death of Prince Henry in 1460 was a great loss to Portugal, but the taste for daring exploration which he had fostered did not fail. After a short period of hesitation the Portuguese court continued to despatch expedition after expedition in search of a sea passage to the Indies and far Cathay. Every attempt opened up new reaches of the African coast, until in 1486 Bartholomew Dias succeeded in reaching the southernmost extremity of that mysterious continent. Thus was brought into sight the accomplishment of Portugal's dream, in token of which fact her king named that point the Cape of Good Hope.

Section 7. Even the magnificent achievement of Christopher Columbus must render its tribute to the imagination and impulse awakened by Prince Henry the Navigator. From all the world that was susceptible to the glamour of brave doings and splendid opportunities Portugal had already commanded a wondering admiration by her unprecedented record of daring exploration. Among the many enthusiastic pilgrims who sought Lisbon as a Mecca of science and enterprise came one Christopher Columbus, a native of Genoa, nursing a project of his own. His dream and his faith were that by sailing into the West he could reach by a new route the treasures

of the East. Failing at last to impart his belief to the king of Portugal, Columbus left Lisbon and devoted the next eight years of his life to arousing Spain's interest in his stupendous enterprise. In 1492, under the auspices of King Ferdinand and Queen Isabella, his three cockle-shell craft set their prows toward the shadowy West. For nearly two and a half months this dauntless dreamer held in check the superstitious fears of his crew, holding to his course upon the lonely seas in spite of doubts and dismays. At last his faith was crowned by the sight of land, now known as Watling Island in the Bahamas. After discovering Cuba and a number of other islands, he turned back without having sighted the mainland of America. His welcome in Spain was one of intensest enthusiasm, and he was speedily despatched upon a second voyage with a larger and better equipped fleet. This time he discovered Jamaica and the island of Dominica. Not until his third voyage, in 1496, did Columbus touch upon the great new continent to which his daring had opened the way, and then it was South, not North America that he visited. Meantime envy and enmity had prevailed against him at home, and a judge was sent out to the new lands in the West, where a Spanish colony had been founded, to investigate certain charges against the great discoverer. The remainder of his story is an infamous record of neglect and ingratitude. Although upon his return in irons to Spain he was immediately restored to liberty,

and even, after a time, sent upon a fourth expedition of discovery, this great man died in 1506 broken with poverty and disappointment, and forgotten by the country to whose glory he had so greatly contributed.

Section 8. In the meantime the Portuguese had not relinquished their dream of a sea-path around Africa to the jewels and spices of the East, a dream whose realisation was to fall to the lot of Vasco da Gama. This intrepid captain, with a fleet of four ships, rounded the Cape of Good Hope in 1497, and early in the ensuing year dropped anchor before Calicut. Close upon the heels of this achievement was despatched a fleet of thirteen armed vessels under a Portuguese commander named Cabral. This expedition, *en route* for Calicut, discovered the coast of Brazil. In 1524 Da Gama died viceroy of India. He had wrought a revolution in the commerce of the East, his ships drawing heavily upon that glittering stream of jewels, silks and spices which had previously poured by caravan routes into Alexandria and Beyrout, whence its distribution had been controlled by the Italian merchant-republics. Having achieved this, their primary object, the Portuguese did not rest content, but continued to push their way southward into Africa and northward into Central Asia. Their Jesuit mission in Abyssinia extended its influence to the kingdom of Congo, and by the seventeenth century Portugal was the dominant power in eastern waters, having established her trade from the Red Sea to China.

Section 9. Although Spain had forgotten Columbus in his dark days, she did not forget the possibilities he had opened up before her. The adventurous zeal which Prince Henry the Navigator had awakened, and to which Columbus had given a new direction, continued at flood in all western countries during the sixteenth century. The work of discovery in the New World was carried on with eager zest by adventurers too many to call for enumeration here. One of these, however, a Florentine named Amerigo Vespucci, demands special mention because of the unique distinction awarded him by a whim of chance as the author of a successful book. The narrative of his four voyages to the new shores beyond the western sea achieved a wide popularity, and what is now Brazil was named America in his honour. This name was gradually extended in its application, until it finally came about that two vast continents served to perpetuate the memory of an obscure writer and adventurer.*

The story of Spanish conquest in America abounds in stirring romance, but lies outside the purpose of this hasty survey. Only a few significant points demand notice here. In 1513 Vasco Nuñez de Balboa, leading an expedition of conquest in Darien, discovered and named the Pacific Ocean, whose waters, when first seen from a western height of

* The earliest existing map on which this name appears is the *Mappe Monde* of Leonardo da Vinci (about 1514), where "America" is inscribed across the southern continent.

land, stretched away in an expanse of smiling calm. The power of Spain in the West spread rapidly during the early part of the sixteenth century, Peru, Mexico, Guatemala and Florida being added in swift succession to the list of her discoveries and acquisitions.

Section 10. But Spain's absorbing interest in these new lands and seas was not all due to the zeal of colonisation and of winning new worlds to the faith of Christ. As in the case of Portugal, she, too, was possessed of a dream which had its roots in the needs of commerce. She desired a westward route to the Moluccas, or Spice Islands, of the East. The first attempt made by the government in this direction closed disastrously. The second, led by the great Magellan, accomplished, for the first time in the world's history, the circumnavigation of the globe. Magellan was a Portuguese, and was already known as a skilled and fearless navigator when he offered his services to Spain. In 1519, with five ships, he started on the voyage which was destined to set him second only to Columbus in the annals of magnificent and daring navigation. A little more than a year from the time of leaving San Lucar, Magellan, with only three remaining of his five ships, sailed into the strait which bears his name. The land on the southern horizon was lurid with volcanic fires, a fact which won it the splendid and desolate title of Tierra del Fuego. After entering the Pacific Ocean this unsated adventurer sailed

steadily north-west, and in a little more than three months' time reached the Ladrone Islands. Steering thence to the Philippines, he was killed in a skirmish with the natives of Matan. A year and five months later one of his ships, with the few survivors of the expedition on board, re-entered the port of San Lucar under the command of Sebastian del Cano. To Del Cano, who had brought his remnant back by way of the Cape of Good Hope, and was thus the first to actually circumnavigate the globe, fell honour, fortune and acclaim.

Section 11. The flame so carefully nourished by Prince Henry the Navigator had spread and increased until the love of daring adventure had become the dominant spirit of the age. The western nations of Europe were alive with it, England, France and Holland pressing enthusiastically in the footsteps of Portugal and Spain. The men who first stimulated English enterprise in this direction, and who may be said to have laid the foundations on which England was afterward to build her commercial and colonial greatness, were John and Sebastian Cabot, father and son, Venetians who had settled at Bristol. These two sailed under royal commission in 1496 to seek unknown lands in England's name. To them we owe the rediscovery of Newfoundland and part of the coast of North America. On a second voyage they sought a way to India by the north-west, but were early forced back by the Arctic ice. Later it was Sebastian Cabot,

then at the head of the Society of Merchant Adventurers, who suggested an English expedition in search of a north-east passage to Cipango and Cathay. With this end in view a fleet was despatched in 1553 under the command of Sir Hugh Willoughby. Willoughby and his crew perished on the Lapland coast, but one of his vessels, captained by Richard Chancellor, reached Archangel. After an overland journey, Chancellor entered Moscow, and out of the relations thus established sprang England's trade with Russia.

Section 12. Their interest once aroused, the English were not sluggish in the matter of maritime enterprise. In this connection the name of Richard Hakluyt cannot be ignored, being illustrious for the promotion and recording of the achievements of the Elizabethan navigators. The main object before the imagination of the English adventurer at this time was the discovery of a north-west passage to the ever-desired treasures of the East. Virginia proved a lode-star to other restless spirits, while still others turned their energies to stirring up the Spanish settlements in the Indies. Martin Frobisher, aiming at a north-west passage in 1576, discovered part of the coast of Labrador and the so-called Frobisher Strait, which is really a deep bay. Some years later John Davis, sailing on the same quest in the employ of certain British merchants, discovered the strait which now bears the name of Hudson. Other expeditions followed. Between 1606

and 1611 Henry Hudson made four voyages into the north-west, in the course of which he discovered the Hudson River and Hudson's Bay. The story of his tragic death amid the wide and desolate waters that bear his name is well known. But the most successful Arctic voyage of the seventeenth century was that piloted by William Baffin, who sailed a course which no ship succeeded in following during the next two hundred years. In a little vessel of only 35 tons, called the *Discovery,* he forced his way to the north water of Baffin's Bay, and returned by skirting the western shore.

To the Dutch also belongs credit for important work in the Arctic. Having a valuable trade with Kola and Archangel, they greatly desired to find a north-east passage around Nova Zembla. It was while striving toward this end that William Barents in 1596 discovered Spitzbergen. Barents succeeded in rounding the north of Nova Zembla, but beneath the bitter hardships of the Arctic winter he paid for his daring with his life.

Section 13. Meanwhile, in the early half of the sixteenth century, the French had inaugurated a policy of discovery and colonisation in North America. In 1534 Jacques Cartier, sailing for the king of France, discovered the Gulf of St. Lawrence, through which he imagined lay a new route to the far East. During a second voyage he ascended the St. Lawrence River to an Indian town on the site where Montreal now stands. To a date nearly two-

thirds of a century later than Cartier's time belong the explorations of Samuel Champlain, who carried on the work of the St. Malo mariner. In 1609 Champlain ascended the Iroquois to the lake which bears his name. He died in 1635, having added greatly to the knowledge of Canada and Acadia. While France was thus directing much of her enterprise toward North America, English navigators were spreading their energies along more scattering and irresponsible lines, trading and buccaneering in the South Seas, or winning individual glory by feats of intrepid seamanship. Such men as Drake, Hawkins and Cavendish, though adding little in the way of actual discoveries, were doing much for the renown of English navigation. Drake, in the *Golden Hind,* was the first Englishman to follow in the track of Magellan. In the course of his famous voyage (1577–1580) he discovered, but did not round, the southernmost point of Tierra del Fuego. Thomas Cavendish was another successful circumnavigator of about this time. Sir Richard Hawkins made a similar attempt, but fell into the hands of the Spaniards. Spain, meanwhile, had been exploring the Amazon, and extending her colonising efforts into Australasia.

Section 14. Located antipodally to Europe, Australia entered late into the story of the world's exploration. It is not quite clear to whom the credit of its first discovery is due, but the Dutch were early and energetic in the field and the continent

for some time bore the name of New Holland. Yet as late as 1642 only the northern and western coasts had been visited. In that year Governor Van Diemen of Batavia sent out two ships under the command of a Captain Tasman, and great gains to geography accrued therefrom. Tasman discovered Van Diemen's Land, New Zealand, one of the group afterwards named the Friendly Islands, and the north coast of New Guinea. Swan River was discovered in 1697, and named from the black Australian swans floating upon its current. About this time the picturesque figure of Dampier, buccaneer and author, appears upon the scene. To him we owe the discovery of Dampier's Strait, and the exploration of parts of the Australian and New Guinea coasts.

Section 15. With the eighteenth century we find the motives behind the explorer changing in the direction which was still more markedly to characterise the nineteenth. Expeditions began to be fitted out for the acquirement of geographical knowledge, independently of motives of trade or conquest. To the early part of the eighteenth century belongs the Jesuit survey of China, not least remarkable among the many achievements of the indefatigable "Brothers of Jesus." In Arabia valuable work was done by the Danish scientific mission whose results are recorded in Niebuhr's *Descriptions of Arabia* (1772). Prominent in the annals of African exploration at this period is the

name of James Bruce of Kinnaird. After some years of varied adventure in the cause of science, Bruce landed in Abyssinia in 1769, determined upon solving the hoary geographical problem of the Nile's source. Reaching the head of the Abai, which was then regarded as the main stream of the Nile, he rested content in the supposed accomplishment of his purpose. In 1788 an association was formed in England with the purpose of collecting information concerning the interior of Africa. Under the auspices of this African Association a young man named Mungo Park made a most interesting attempt to trace the course of the Niger, whose identity some geographers confused with that of the Congo. A second expedition under Park tried to descend the Niger to the sea, but the entire party perished in the attempt.

Steady advance was made in Polynesian exploration during the eighteenth century, islands and island groups being rapidly added to the charts. The Dutch discovered Easter Island in 1722, and an English expedition of 1767–69 made known Tahiti, Sir Charles Saunders's Island, the Charlotte and Gloucester Island, and Pitcairn Island. But in many respects the most valuable work of the century was that of Captain Cook. In 1767 James Cook, who had begun life in the unpromising employment of a haberdasher's apprentice, led a scientific expedition to Tahiti for the purpose of making certain astronomical observations. During a stay

of more than three years in that region, Cook explored the Society Islands and surveyed much of the coast of New Zealand and of New South Wales. On a second voyage he turned his attention to Antarctic exploration, reaching a latitude of 57° 15′ S. After returning to the Society Islands he again sailed toward the Pole until he was stopped by ice at a south latitude of 71° 10″. The next enterprise of this tireless mariner was at the other end of the earth, his object being to make a north-east passage from the Pacific to the Atlantic. In 1778 he determined the westernmost point of America. Then, after passing through Behring Strait he reached a north latitude of 70° 41′, but was turned back by the ice. Having discovered Cape North on the Asiatic shore, Cook revisited the Sandwich Islands, where he was murdered by the natives. About the time of Cook's voyages there was a distinct revival of the spirit of geographical discovery, which had suffered a gradual decline since the beginning of the seventeenth century. This new interest looked mainly in the direction of the southern Polar seas. In 1771 Kerguelen Island was discovered by a French ship under M. Kerguelen, and in 1785 France sent out a carefully planned expedition commanded by La Perouse. After a daring and extended voyage in the mysterious Antarctic waters, men and ships perished in a hurricane near the island of Vanikoro, their fate remaining a mystery for forty years.

Although interest during the 18th century centered

chiefly in the southern and Antarctic seas, and in the quest for "the great southern continent," the Arctic was not entirely neglected. The Russians had surveyed the whole of the northern coast of Siberia, and Vitus Behring, a Dane in the Russian service, had discovered, in 1728, the strait which separates Asia and America. In 1770 a sledge expedition, led by a Russian merchant, discovered the New Siberian Islands, famous for their treasure of fossil ivory. English enterprise in the Arctic had been kept alive by the Royal Society and the Hudson's Bay Company. At the instigation of the latter body, attempts were made to discover a passage westward from Hudson's Bay, and also to reach the unknown sea to the north of America. This last was accomplished at two points, an expedition descending the Coppermine River to its outlet in the Arctic Ocean in 1771, and another, in 1789, reaching the mouth of the Mackenzie River. In 1773, at the suggestion of the Royal Society, a scientific attempt was made to reach the North Pole. This expedition, commanded by Captains Phipps and Lutwidge, was stopped by ice at latitude 80° 48′ N. From 1793 to 1815 practically all European enterprise in this direction of exploration was checked by the shadow of the Napoleonic wars.

Section 16. The nineteenth century, with which this book is to deal, is characterised by the fact that the motives behind its expeditions of discovery have been predominantly scientific. The splendid dreams

of new empires and golden sources of trade have faded into the past, and their place is usurped by the thirst for knowledge for its own sake. The explorer himself may be now, as of old, a dreamer actuated by love of fame and adventure, but the avowed aim of the government behind him is the advancement of science, and it is in proportion as he accomplishes this end that the enthusiasm of the world greets his achievement. In Africa, it is true, we still see the empire-builder at the heels of the explorer. But the most expensive as well as the most heroic explorations of the century have been directed toward the spectral Arctic regions, where colonisation is impossible, but where science looks for rich reward.

An accurate map of the world at the beginning of the century would show vast unexplored regions in the Arctic and Antarctic, in Africa, in Australia and in South America; while the interior of Asia, and great tracts in North America, held many problems for the geographer. Since then the advance of the explorer has been steady and systematic. Yet in the enormous unexplored tracts of the Antarctic seas it is safe to say that an unknown continent waits with all its secrets behind the southern ice-packs; and in the unmapped area around the North Pole, which has only one-third the extent of that in the Antarctic, room might yet be found for more than a dozen countries the size of England. In Africa, a considerable section of the Sahara lying to the south of Algeria is still a blank upon the map. Another un-

known district of even greater extent lies in the very centre of the continent; and farther to the eastward again the valley of the Sobat awaits an explorer. In Asia a considerable portion of Arabia remains dark, and Tibet still guards her mysteries. A vast district lying to the north-west in South America, the forest-clad region in which the dreams of the sixteenth century adventurers located El Dorado, is still unexplored; and southward again in the same continent lie a number of other sections yet unknown.

Almost every civilised country has now its Geographical Society. Yet much remains to be done; and the field still calls for men of heroic fibre and incisive judgment. Undoubtedly the most difficult stronghold of the geographical Sphinx is now beneath the vast and desolate skies of the Antarctic; while South America offers kindlier but scarcely less important opportunities for the explorer of the twentieth century.

To-day the known world means those lands which are known to the map-makers of all civilised nations. But our knowledge of any portion of the earth is a matter of degree, and the light of science is constantly revealing new worlds long after the footsteps of the explorer have passed on. Dr. Mill has well said: "Despite recent advances, there is no place even yet fully known, but, notwithstanding our ignorance, none concerning which there is not some twilight glimmering of information. . . . As the wave of exact topographical exploration ad-

vances, it is being followed by a wave of geological exploration, the outcome of which is the geological map. That again should be followed—though of this there is as yet no sign anywhere—by the special surveys necessary for good maps of the distribution of climate, vegetation, economic products, population and industries. In a sense, any region is unknown until all these surveys have been completed." This book, however, will concern itself little with the secondary and more minute explorations, the results of which appeal rather to the specialist in various branches of science than to the general reader.

PART II.

ARCTIC EXPLORATION.

CHAPTER II.

DISCOVERIES DURING THE FIRST THIRTY YEARS OF THE CENTURY.

Section 1. The glamour of the white north has cast its spell upon this most imaginative century. Under its influence men have forced the North-West and North-East Passages; traced the perilous northern coast of America, discovered the North Magnetic Pole, and added to the maps vast unknown lands and frozen archipelagoes. We have pushed nearer, too, than ever before, to the North Pole, that strange lodestone of the adventurous heart. At varying intervals during the last hundred years the exploring nations of the world—and to-day these are mainly of our own stock-race—have been possessed with the fever of Arctic enterprise. In the words of Dr. Hugh Robert Mill: "Polar research is a survival, or rather an evolution, of knight-errantry, and our Childe Rolands challenge the 'Dark Tower of the North,' as dauntlessly as ever their forebears wound

slug-horn at the gate of enchanted castle. The 'woe of years' invests the quest with elements which redeem failure from disgrace; but whoever succeeds in overcoming the difficulties that have baffled all the 'lost adventurers' will make the world ring with his fame as it never rang before."

In the past men thrust their ships into Arctic waters lured by the golden dream that so long possessed the western nations of Europe, guessing that here was a gate of ice opening a shorter way to the fragrant treasure-house of the East. At this day, except for the waning industry of the whale fisheries, commerce has little at stake in these iron seas. The North-West Passage by ship has been accomplished, and proved impracticable. But where even the visionary eyes of trade could see only groaning ice-packs and limitless desolation, science discovered vast and stimulating possibilities. To the hunger for knowledge, that last and highest motive of geographical discovery, must be credited the Arctic work of the century. An idea of the importance of this work, from a scientific point of view, may be gathered from the following words of General A. W. Greely, an authority upon Arctic achievements and himself illustrious in that heroic field: "Within the Arctic Circle have been located and determined the poles of the triple magnetic forces. In its barometric pressures, with their regular phases, have been found the dominating causes that affect the climates of the northern parts of America, Asia, and

Europe. From its sea-soundings, serial temperatures, and hydrographic surveys have been evolved that most satisfactory theory of a vertical inter-oceanic circulation. A handful of its dried plants enabled a botanist to prophetically forecast the general character of unknown lands, and in its fossil plants another scientist has read unerringly the story of tremendous climatic changes that have metamorphosed the face of the earth. Its peculiar tides have indicated clearly the influences exerted by the stellar worlds upon our own, and to its ice-clad lands science inquiringly turns for data to solve the glacial riddles of lower latitudes."

A curious feature of these sinister regions, where frost and berg and grinding floe menace the adventurer, and peril becomes as his shadow in the white solitudes, is their salubrity. No noxious germs can exist in this tonic and antiseptic air. Dr. Conan Doyle, who draws his impressions from a summer on an Arctic whaler, speaks with enthusiasm of the peculiar fascination of these chilly seas. He says: "It is a region of purity, of white ice and of blue water, with no human dwelling within a thousand miles to sully the freshness of the breeze which blows across the ice-fields. And then it is a region of romance also. You stand on the very brink of the unknown, and every duck that you shoot bears pebbles in its gizzard which come from a land which the maps know not."

Section 2. The Arctic Sea occupies a huge basin

fringed by the frozen northern shores of Europe, Asia and America. Through three channels ships from the outer ocean may enter these ice-bounded waters. The widest of these channels, measuring 660 miles at its narrowest part, gives upon the North Atlantic between Greenland and Europe. Another lies to the west of Greenland, by way of Davis Strait and Baffin Bay, with a width of about 165 miles at the Arctic Circle. The third, and narrowest, is Bering Strait, the only communication between the smiling Pacific and the spectral polar seas.

Through the long sunless winter this sea is frozen in every direction, the ice-pack groaning and rending in the grip of black tide-races and great icy winds. Then cold and desolation are supreme. In the prolonged absence of the sun, life takes on a sense of weirdness and unreality. When the rustling fingers of the Aurora shake luminously across the sky, the Eskimo dogs crouch upon the snow, howling with strange superstitious fear.

In the brief but brilliant Arctic summer, when the sun at midnight wraps the snow of the hills in all the tints of the rainbow, the sea-ice breaks up into floes which drift away southward to cool the North Atlantic, or become embayed along the coasts of islands and continents. These great fields of ice are traversed by "leads" or lanes of open water, which, with a shift of wind, may close or open in an hour. The whaling captains say that sometimes, in rare years, the pack opens to the Pole; but if this be so,

no ship has yet seized the opportunity offered. In summer, too, the icebergs, in silver procession, file out from their imprisoning fiords and bays where the great glaciers creep down to the sea. By July, the sombre cliffs are noisy with sea-birds, and the blue waters alive with furred and finny monsters. Then the saxifrage and the buttercup and the yellow Arctic poppy make bright the meagre patches of sun-steeped soil. There is a stir, too, of insect life, and butterflies, no less daring than the flowers, blossom upon the air. Dr. Robert Brown, in one of his visits to the Arctic region, found it convenient to sleep by day and travel by night—the sun being then still above the horizon—to escape the intense heat of noon upon a treeless land. Mirages, too, during the long months of daylight, appear in the sky, rivalling those of tropical deserts.

While more than a third of the 8,201,883 square miles surrounded by the Arctic Circle remains unknown, it is not possible to speak definitely of the region as a whole. The area is too vast. It can be safely said, however, that the wooded country does not find its way across the Arctic Circle except in some few parts of Siberia and Russia, in Lapland, and along the American shore of Bering Strait. At best these dreary forests are desolate and depressing, their spruce and firs, bearded with long gray lichens, giving a funereal aspect that is not lessened by the forlorn and stunted specimens of white birch. Yet within this ice-chilled region more than 700 species

of flowering plants and nearly 1,000 varieties of cryptogams have been discovered.

For the human races which inhabit the margin of the Arctic, life is strenuous and uncertain. In Arctic Europe and Asia the Laps and Samoyeds migrate with their herds of reindeer in patriarchal fashion between the coast in summer and the inland plains in winter. When we come to the warlike and independent Tchuktches, living along the Asiatic shores of Bering Strait, we find them about equally divided into two classes; one of these, owning no herds, is confined to the coast, while the other, living by trade and reindeer-raising, leads an untrammelled nomadic life. Along the Arctic fringe of America, and up the Greenland coasts, are spread the mild and semi-communistic Eskimo people. This race, owing to its immemorial feud with the Indian tribes of the interior, is practically confined to the bleak shores of the Polar Sea. With the exception of the musk ox and the caribou, the Eskimos have no means of support away from the coast. The sea and the ice-floe are their larder, and God's bounty is upon them when the soft-eyed seals herd plentifully. The roaring of the fierce bull walrus and the noiseless prowling of the sinister white bear are their assurances against starvation.

Section 3. In 1818, through the influence of Sir John Barrow, then Secretary of the Admiralty, a law was passed in Great Britain for the promotion of polar discovery. Under this law a reward of

£20,000 was offered for making the North-West Passage, and the sum of £5,000 for the first who should achieve the 89th parallel of north latitude. In the same year two expeditions were despatched, one to seek a passage westward, by way of Davis Strait, to the Pacific, the other with instructions to reach the same goal by crossing the North Pole. The two vessels of the latter expedition, commanded by Captain D. Buchan, seconded by Lieutenant John Franklin, sailing by the Spitzbergen route, were beset by ice at 80° 38′ N. Freed by a storm, they returned to England in an almost sinking condition, having failed utterly of their vast undertaking.

The expedition under Captain John Ross, although it also fell completely short of its purpose, was not so barren of results. Advised by the ice-bound whaling fleet at Hare Island, Ross's two vessels hugged the western coast of Greenland as they worked north through the ice-floes. At 76° 54′ N., his farthest northing, Ross formed the mistaken opinion that there was no opening northward from Baffin Bay. Similar hasty conclusions marred the remainder of the voyage, robbing the expedition of discoveries which were actually within its grasp. Turning south-westward, he passed Jones Sound, which was ice-blocked, and sailed some 50 miles westward into Lancaster Sound. Deceived by a mirage, "he made the astonishing error of thinking this waterway, 30 miles wide, was only a bay surrounded by mountains." Ross then returned to England.

Baffin Bay, discovered by William Baffin in 1616, had come to be regarded as mythical by the map-makers. Its re-discovery by Ross not only rehabilitated the fame of its discoverer, but opened a rich field for adventurous whaling fleets in the "North Water" of the Bay. The most picturesque additions to our knowledge of the Arctic contributed by Ross's voyage were gathered along the wild west coast of Greenland. Near Cape York, Ross found the Etah Eskimos, hitherto unknown, to whom he gave the name of Arctic Highlanders. This tribe is of unique interest even among the strange peoples of their icy lands. Their habitat forms the most northerly outpost of the human race. Possessing no boats, and cut off from their southerly kin by the huge glaciers of Melville Bay, they are a completely isolated people. Along the gigantic cliffs, deep inlets, and rocky island fringe of the sombre coast they range as far as 79° north. Among their goods and chattels are dogs, sledges, and curious knives of meteoric iron. At Cape Dudley Digges, beyond Cape York, Ross observed the interesting phenomenon of red snow (*Protococcus nivalis*).

Section 4. Within a month of the return of this expedition another attempt to discover a North-West Passage was determined upon. William Edward Parry, who had accompanied Ross, was put in command. After skirting the Greenland coast to 73° N., he fearlessly thrust his ships, the *Hecla* and the *Griper,* into the "Middle Ice" of Baffin Bay, forc-

ing them through to Lancaster Sound, which he was thus able to reach by the 1st of August, 1819. This water being clear of ice, he pushed eagerly westward into the unknown. The surrounding mountains of the previous year had disappeared. Through a magnificent waterway, with unknown lands opening out on either hand, and blue channels that had never known a keel luring him on the north and south, he held steadily west. On this course the variation of the compass increased rapidly until at one point the needle indicated due south instead of north. At Byan Martin Island, to the north of Parry Sound, the dip of the suspended needle was within little more than one and a half degrees of vertical. Captain Sabine, the scientist of the expedition, took magnetic observations on this voyage which supplied a completely new set of facts.

Heavy ice forced Parry into winter quarters on Melville Island, which he partially surveyed. In spite of his impatience, it was the 8th of August, 1820, before he could again make sail westward, and then his high hopes were swiftly shattered. A channel which he named Banks Strait was all that separated him from the Polar Sea; but every effort to work his ships among the great floe-bergs and ancient ice that blocked this channel ended in failure. On the way home, Parry discovered an Eskimo settlement at the mouth of Lancaster Sound. The expedition reached England in November, after a voyage which, though failing of its main purpose,

had accomplished more for Arctic exploration than any since the days of Baffin. Parry's ships were the first to pass between the North and the North Magnetic Poles, and his discoveries include the great archipelago which bears his name. His farthest west was 114° W. longitude, which is more than half way from Greenland to Bering Strait.

Section 5. Meanwhile, Parry's friend, Franklin, was leading an overland expedition through Arctic America, to survey its frozen coasts, which had hitherto been touched at only two points, by Hearne and Mackenzie. His terrible sufferings and splendid achievement under strange conditions and in the face of unfamiliar emergencies are described in this book under the head of exploration in Canada.

So enthusiastic was England over Parry's work that the Admiralty immediately gave him command of another venture. No word had returned as yet to tell of Franklin's discoveries, but Parry felt convinced that the ice conditions along the unknown Arctic coast of America would prove even more favourable to navigation than the course he had previously opened through Lancaster Sound, Barrow Strait and Melville Sound. Leaving England in May, 1821, he sailed through the fierce tide races of Hudson Strait, crossed the mouth of Fox Channel which perpetuates the name of that quaint old adventurer, "North-West Foxe," and entered Repulse Bay. For nearly a hundred years this bay had been a subject of controversy, many believing it to be a

strait, and one of the links in the long-sought North-West Passage. Parry's survey settled this dispute forever.

Returning to Fox Channel, the *Fury* and *Hecla* turned northward. Ice delayed them, and further time was lost in the blind alley of Lyons Inlet, which seemed at first to offer a passage westward. Driven south again by a storm, Parry went into winter quarters at Winter Island, just north of Lyons Inlet. During the long dark season of biting winds the monotony of waiting was broken by seal and walrus hunts, and by intercourse with the neighbouring Eskimo. These people have a remarkable faculty for roughly charting lands and waters through which they have hunted or migrated. From the maps which they drew for him, Parry learned of an unknown strait to the north of Melville Peninsula. This he afterwards named Fury and Hecla in honour of his ships.

By July 12, 1822, the ice had so far broken up as to permit his advance northward to Hecla and Fury Strait, which he entered, only to be stopped by an impassable floe. This remained solid all summer, but as Parry firmly believed that once through this strait his keels would cut the western polar sea, he waited determinedly, preparing winter quarters at Igloolik, at the eastern entrance. But the following spring found the men of the expedition in such a state of lowered vitality that their leader was compelled to turn his reluctant prows toward England.

Section 6. In spite of the comparative lack of results from this voyage, the enthusiasm of Arctic enterprise remained unabated in England. In 1824, the Government planned four expeditions, all of which aimed, either directly or indirectly, at the solution of the ancient problem of a North-West Passage for ships. One of these was commanded by the daring and experienced Parry, whose confidence in the feasibility of the undertaking remained unshaken. Sailing again in the *Hecla* and *Fury,* he did not reach Lancaster Sound until September 10, 1824, having met with disheartening delays among the ice of Baffin Bay. His plan this time was to push through Prince Regent Inlet, which he had discovered in 1819 opening from the south of Barrow Strait. From this waterway he trusted to finding another channel leading westward. But again the chances of the Arctic doomed this great navigator to disappointment. New ice formed rapidly, and he was forced into winter quarters on the desolate shore of Port Bowen, Prince Regent Inlet. On the 12th of July, 1825, his ships again set sail southward. In opposition to Parry's own canons of ice-navigation, they followed the west instead of the east coast of the inlet. Meeting with fierce storms and heavy ice, the *Fury* was driven ashore four times, and at last had to be abandoned with all her stores. Discouraged and baffled, the expedition returned to England in the *Hecla.*

Captain Lyon, in the *Griper,* left England the

same summer as Parry, with orders to winter at Repulse Bay, and explore by sledge in the spring the unknown coast of America as far as Point Turn-again of Franklin's first journey. After some terrible experiences among the ice, the *Griper* returned in a battered condition, without having even reached Repulse Bay.

The second journey of Franklin through Arctic Canada, and his exploration of hundreds of miles of unknown coast, are described elsewhere. A co-operating expedition under Beechey in the *Blossom* entered Bering Strait from the Pacific, August, 1826, and sailed eastward as far as 163° 40′ W. From this point a barge was sent forward under the command of Elson, Beechey's mate. Elson passed Icy Cape, never before doubled, and followed the unknown coast for 126 miles to Point Barrow, 70° 24′ N., 156° 22′ W. Next to Boothia Felix, this is the most northerly point of the American continent. Franklin and Elson failed to connect their discoveries by some 160 miles.

Meanwhile, Captain Edward Sabine had been enlarging our scientific knowledge of polar regions by his important pendulum observations, carried out mainly at Pendulum Island, on the east coast of Greenland. This was in 1823. Associated with Sabine was Captain Clavering, who skirted in his ship the looming and inhospitable coast from 72° 5′ N. to 75° 12′ N., and explored by boat Gale Hamke Bay. In this forbidding region of towering

cliffs and immense glaciers he was astonished to find a settlement of Eskimo. Their houses were seal-skin tents pitched upon the dreary beach, where a number of rough graves gave evidence that they were not a mere migratory band.

Section 7. From 1821 to 1824, Russian enterprise had been directed toward that rugged scimitar of land which thrusts northward through the frozen seas, looking on the map as if the Ural Mountains had far overstepped the northern limits of the continent. Centuries ago a Russian fisherman named this strait-divided island Nova Zembla, "New Land." Still earlier, its southern shores were familiar to the Novgorod hunters. But its most romantic association is with the heroic name of William Barents, who came to his death upon its desolate northern coasts more than three hundred years ago. During the period mentioned at the beginning of this paragraph Captain Lütke explored and surveyed the west coast as far north as Cape Anjou, at the same time gathering important hydrographical observations.

The New Siberia Islands, known during the previous century for their wealth of fossil ivory, were surveyed by a Russian officer named Hedenstrom, from 1809 to 1812. In 1821 Lieutenant Anjou made a more exhaustive survey of these islands, and examined the ice conditions to the north. He found advance in that direction impossible after some twenty or thirty miles, owing to thin ice and

open water. Baron Wrangel, carrying on investigations from the mouth of the Kolyma between 1820 and 1823, was also stopped by thin ice in his attempts to push northward. But daring and valuable as was the Arctic work done by Russians during the first quarter of this century, its results as shown upon the maps of ordinary scale are represented by a few new islands and island groups in the shallow Siberian Ocean.

Section 8. In 1827 Parry made a determined push for the Pole. Sailing in the *Hecla,* he followed the Spitzbergen route from the North Atlantic, which Greely considers "unquestionably the most promising of *navigable* routes." On the 21st of June Parry left the *Hecla* in Trurenburg Bay, and continued northward with two sledge boats. These were boats fitted with steel-shod runners for crossing ice. His party numbered 28, and was provisioned for 71 days. Land once left behind, their progress was slow and arduous. Day was given up to rest, the journey being resumed at 6 P.M. and continued until morning. Fog, rain, the roughness of the ice and the smallness of the floes impeded their march, and the same road had often to be travelled as many as five times, the way being so difficult that the whole load could not be taken forward at once. At first they succeeded in lessening their distance from the Pole at the rate of five miles a day, but at last they found that the ice was drifting them south faster than they could struggle north. On

July 24th Parry achieved his extreme northerly point, 82° 45′ N., 20° E. Two days later he had lost ground. He had, however, secured the record for "farthest north," which was not broken for 48 years. This voyage crowned the career of one of the greatest of Arctic navigators. Parry, together with his friend Franklin, who had just returned from his great overland journey, received the honour of knighthood for his achievements.

The ice over which Parry had dragged his sledge boats was part of what is known to explorers as "the palæocrystic sea," and called by the whalers, in more vigorous phrase, "the barrier." A ship sailing north between Greenland and Spitzbergen, after battling its way among treacherous floes, is stopped somewhere about the eighty-first degree by a vast reef or wall of ancient and rugged ice. This impenetrable ice-pack, which grinds and groans at the mercy of wind and tide, appears to be the final barrier between man and the Pole. The huge floe-bergs whose birthplace lies somewhere within this palæocrystic sea have been known to attain a thickness of 600 to 900 feet. It is estimated, from their average yearly accretion, that such a berg must have been in the earlier stages of its formation while Solomon was building the temple. Gen. A. W. Greely argues from these floe-bergs, which differ in shape and character from the ordinary icebergs, the existence of low-lying lands supporting a vast polar ice-cap, by which the sea is constantly fed with these tremen-

dous floating table-lands of ice. Others believe that the floe-bergs are born of the sea itself. According to this theory they are masses of floe ice which have been imprisoned for hundreds or even thousands of years in these most northern waters, growing slowly to their gigantic proportions by yearly accumulations of frozen and compacted snow. Under the impulsion of tides, winds and currents this terrible circumpolar ice-pack undergoes changes, vast in themselves, but slight in comparison with the whole area concerned. Thus at times, for some thousand square miles, its surface may present the appearance of a frozen ocean; at others it reveals open spaces of varying size, but sometimes so large as to have given rise to the idea of an open polar sea. Over these solitudes of ancient ice broods the deepest mystery of the Arctic.

Section 9. Greenland, the great mother of glaciers, is a continental mass of land stretching from within six degrees of the Pole to seven below the Arctic Circle. Its lofty ice-capped plateau is lifted on precipitous cliffs above the sea, but this dark margin is fringed and bitten by many deep fiords and sheer clefts through which the inland ice grinds its way to the sea. The population of Greenland consists mainly of Danish Eskimos, who number more than ten thousand and occupy the western coast from Cape Farewell to Tasiusak. North of these, and isolated from them, is the small tribe of Cape York Eskimos already mentioned. Along the little-known

western coast, whose looming cliffs are shrouded in perpetual fog, are scattered other tribes amounting to some six hundred souls. These natives regard the unknown interior with superstitious dread. To them the permanent ice-sheet, which covers nine-tenths of the continent to a possible depth of 3,000 feet, is peopled with evil and terrible spirits, inhabiting monstrous forms.

Of all the problems presented by this strange land, none so grips the imagination as that of the lost colonies of the *Eastern Bygd,* supposed to have been located somewhere near the south-east corner of Greenland. The story of the Eastern Bygd may be concisely stated in the words of Doctor Conan Doyle: "It is a commonplace of history that when Iceland was one of the centres of civilisation in Europe, the Icelanders budded off a colony upon Greenland, which throve and flourished, and produced sagas of its own, and waged war with the Skraeglings or Eskimos, and generally sang and fought and drank in the bad, old, full-blooded fashion. So prosperous did they become that they built them a cathedral and sent to Denmark for a bishop. The bishop, however, was prevented from reaching his see by some sudden climatic change which brought the ice down between Iceland and Greenland, and from that day (it was in the fourteenth century) to this no one has penetrated that ice, nor has it ever been ascertained what became of that ancient city, or of its inhabitants."

Lieutenant W. A. Graah, of the Danish Navy, was the first modern explorer to visit south-east Greenland. At Julianehaab, in the extreme south of the continent, he wintered, preparatory to his search for these "lost colonies." He spent the time waiting in the examination of curious ruins along the Julianehaab coast. Holm, who studied these more carefully half a century later, reports that there are 100 known groups, each group consisting of from one to thirty ruined buildings. Among these are several well-built stone churches, and some archæologists believe that here, at the outset, Graah stood among the only remaining traces of the lost civilisation which he sought. However this may be, in the spring of 1829 he pushed forward his search, exploring the east coast from Cape Farewell to the neighborhood of Cape Dan, 65° 18′ N. Here he was stopped by an insurmountable barrier of ice. The Eskimos, among whom he spent the following winter, had never seen white men, but he found no difficulty in establishing friendly relations. His quest, however, was unsuccessful.

CHAPTER III.

FROM 1829 TO 1848.

Section 1. After Parry's third failure to make the North-West Passage, the discouraged Admiralty relaxed its efforts in that direction for the space of some ten years. But England still held to the quest through the zeal of private enterprise. Felix Booth, a wealthy London merchant, fitted up the paddle-steamer *Victory* and despatched it in 1829 under the command of Captain John Ross, who had so incredibly missed great discoveries in his voyage of 1818. With him on the *Victory* (the first steamer used in Arctic work) was his nephew, James Clark Ross. Following the route already described, across Baffin Bay and through Lancaster Sound, Ross entered Prince Regent Inlet, as had Parry in 1824. A portion of the canned foods, powder, and various supplies which Parry had landed from the wrecked *Fury* were taken on board, but no trace of the vessel itself could be found. Skirting North Somerset, which forms the west coast of the inlet, Ross reached its southern extremity without recognising the fact, mistaking for a bay the strait which separates this land from the most northerly point of North America. This strait, the real object of his search, re-

mained unknown for another quarter of a century. The strange land which he now followed southward he named Boothia Felix, in honour of his patron; and in one of its desolate harbours the *Victory* was forced to winter. The darkening autumn was made weirdly beautiful by the illuminations of the *Aurora Borealis;* and during the long winter the solitude was relieved by friendly intercourse with the Eskimos.

The following summer, the ice which had barricaded the little *Victory* in her winter quarters would not give up its prey. Nor did another year bring release. For three winters the Rosses stayed by their imprisoned ship. Late in May, 1832, they abandoned her, owing to failure of the food supply, and forced their desperate way by boat to Fury Beach, where Parry's *cache* offered their only hope of life. From there, after rest and recuperation, they struggled to reach Lancaster Sound, already a resort of whalers, but were forced back by impenetrable ice to Fury Beach. Here they built a house, and wintered. In August, 1833, they reached Navy Board Inlet, near the mouth of Lancaster Sound, where they were rescued by the whaler *Isabella.*

But the time of their enforced sojourn in Boothia Felix Land had not been barren. A series of summer explorations under the younger Ross proved this land to be a curious club-shaped extension of the American continent, joining the mainland by an isthmus about 15 miles wide. James Ross also dis-

covered and explored part of the western coast of King William Land. His eyes were the first to look upon the waters of Franklin Passage and Victoria Strait. And to his lot fell the discovery which, had none other been made, would have abundantly redeemed the voyage from failure. In the west of Boothia, on a low flat coast inlaid with ridges, he located the North Magnetic Pole, over which, on the 1st of June, 1831, he planted the Union Jack. This spot, chosen by Nature as "the centre of one of her great and dark powers," his observations placed in latitude 70° 05′ N., longitude 96° 44′ W. Here the needle marked 89° 50′ of verticity, showing that it was within 1½ to 2 miles of the absolute point sought.

General A. W. Greely, in his *Handbook of Arctic Discoveries,* says of this remarkable expedition, which spent five years in the Arctic regions, cut off from all communication with the world: "Its observations are probably the most valuable single set ever made within the Arctic Circle, involving not only the climatic conditions of Arctic America, a local matter, but also the determination of the magnetic elements at their very poles, a subject of world-wide importance."

Section 2. Captain Lütke's explorations on the west coast of Nova Zembla have been mentioned in the preceding chapter. To the exertions of Pachtussow, another Russian, between 1832 and 1835, we are indebted for our widest knowledge of the

eastern shore. He conducted explorations both by sledge and ship, and his survey extended as far north as Pachtussow Island, 74° 24′ N. His zeal led him to a fatal overtaxing of his strength, and he only lived to reach Archangel. Among the most interesting of the many explorations which in more recent times have enlarged our knowledge of this land may be mentioned those of Johannesen, a Norwegian hunter, who in 1878 discovered a northern outlying island (Lonely Island), free of snow and abounding in game; and of Captain Carlsen, who circumnavigated Nova Zembla in 1871 in the sloop *Solid*, the first keel after 275 years to follow the track of Barents into Ice Haven. Here were found many relics of the great sailor, even books and engravings being marvellously preserved beneath their coatings of ice.

Although classed among uninhabited lands, Nova Zembla has been the scene of an interesting experiment in colonisation during the latter part of this century, when the Russians planted a permanent Samoyed settlement on Moller Bay. The interior of the country is almost unknown, but discoveries of coal, iron, copper and gold suggest a frozen treasure-house of mineral wealth.

Section 3. During the summers of 1838 and 1839, France commissioned *La Recherche* to carry a party of scientists to Spitzbergen. The first year they made Bell Sound their centre, but in 1839 occupied Magdalena Bay, 79° 35′ N. Madame d'Aunet ac-

companied the second expedition, thus achieving the distinction of being the only white woman on record to reach such a high latitude. At Magdalen Bay there is a curious graveyard, where rest, in all probability, the bodies of adventurous sailors who flocked to these shores nearly three hundred years ago, when the Spitzbergen whale fishery was the greatest in the world. Madame d'Aunet says: "I counted fifty-two graves in this cemetery, which is the most forbidding in the wide world; a cemetery without epitaphs, without monuments, without flowers, without remembrances, without tears, without regrets, without prayers, a cemetery of desolation, where oblivion doubly environs the dead, where is heard no sigh, no voice, no human step; a terrifying solitude, a profound and frigid silence, broken only by the fierce growl of the polar bear or the moaning of the storm."

La Recherche was under the command of Captain Fabvre, and among the scientists was Charles Martins. Science in nearly all its branches was the richer for this expedition. Martins, whose name is famous for his generalisations concerning extinct floras, devoted himself specially to the study of glaciers. The results of his work "formed an epoch in the study of these phenomena."

Section 4. Meantime, the British Government had been stirred to new activity in the direction of the North-West Passage by a petition of the Royal Geographical Society. In 1836 Sir George Back was placed in command of the *Terror*, with orders

"to proceed to Wager River or Repulse Bay, and having crossed Regent Inlet, examine the coast-line east to Cape Kater and west to Back River." This voyage also was doomed to failure, due to adverse and overwhelming circumstance. Beset near Cape Bylot, Hudson Bay, in the middle of September, the *Terror* was for ten months at the mercy of the pack. During this period the expedition again and again escaped utter disaster as by a miracle. Sometimes fearful staggering towers of ice overhung the ship on every side, moving in the grip of forces before which the stout timbers of the *Terror* would have been as the dry shell of an egg. Day after day new horrors loomed around them, yet day by day destruction hesitated, and passed by, until the hideous grindings and disruptions of the pack became almost as the commonplaces of life.

At last, hurled upon her beam ends and lifted upon the main floe, the *Terror* was drifted to the western end of Hudson Strait, which it reached in May. Not till July did the floe break, and then, in spite of precautionary preparations which had occupied a month, the vessel was nearly capsized. Released from her terrible ice-dock, she crowded sail for England, which she reached in a foundering condition. Back tells how, during the long and awful winter, all experienced "the weariness of the heart, the blank of feeling, which gets the better of the whole man," and from which no occupation or amusement has the power to rouse. Although no geographical dis-

coveries resulted from this voyage, it deserves mention for its exceptional perils and escapes. The Arctic work which made Back's name immortal is described elsewhere under the head of exploration in Canada.

Section 5. There was another lull of nearly ten years in British Arctic enterprise before the representations of the Royal Geographical Society resulted in Sir John Franklin's last and fateful voyage. Then the *Erebus* and *Terror,* just returned from explorations in the far south, were equipped for Arctic service and given to the command of the veteran Sir John Franklin, now on the verge of sixty, but as enthusiastic as ever for the work in which he had already so greatly suffered and achieved. Second in command was Crozier, who had accompanied Parry on three voyages, and served with Ross in Antarctic waters.

Franklin's official instructions directed him to follow Lancaster Sound and its continuation, pushing westward with all haste to about 98° west longitude. From that point he was to use every effort "to penetrate to the southward and westward, in a course as direct towards Bering's Strait as the position and extent of the ice, or the position of land at present unknown, may admit." If, however, this course proved unfeasible, and if the mouth of the strait between Devon and Cornwallis Islands (Wellington Channel) had been observed in passing to be free of ice, he was to carefully consider "whether that

channel might not offer a more practicable outlet" to the open sea.

The *Erebus* and *Terror* sailed on the 26th of May, 1845. Franklin's entire party consisted of 129 men, and was provisioned for three years. Late in July of the same year a whaler in Baffin Bay saw the two ships moored to an iceberg, waiting for a chance to push through the middle ice to Lancaster Sound. Then the expedition disappeared into those mysterious solitudes from which it was destined never to return. There can be no doubt that before these brave lives were blotted out amidst the cruel white desolation, their discoveries had been wide and important. But so meagre are the only definite records which long years of heroic search have been able to recover that the story of the expedition has to be filled in mainly by the imagination upon a background of darkness and mystery. The bare-known facts are as follows:

Finding ice-conditions unfavourable on the first of the two routes suggested by the Admiralty, Franklin attempted the second course, navigating the unknown waters of Wellington Channel as far as 77° N. latitude. Whatever explorations were carried on from this point are unrecorded, but we know that he returned southward by the west coast of Cornwallis Land, and wintered at Beechey Island, 74° 42′ N., 91° 32′ W. Here three men died. In the following summer, by a route not clearly ascertained, the *Erebus* and *Terror* reached Victoria Strait, where they were beset on the 12th of September, 1846, in

latitude 70° 05′ N., longitude 98° 23′ W., in the sea ice ten miles north of King William Land.

A record deposited at Point Victory by one of Franklin's sledge parties in May of the following year reported "all well." Not many days later (11th June, 1847) Sir John Franklin died on board the *Erebus,* and the command devolved upon Crozier. The summer came and passed, and the ships found no release. Another dark winter closed over them, bringing disease and death. Twenty-four men died, among whom were nine officers. Then, on the 25th of April, 1848, the survivors abandoned their ships, which had drifted with the ice 19 miles to the south-west, and started across King William Land in the direction of Back's (Great Fish) River, at least 250 miles distant. Their only hope was to reach by this route some settlement of the Hudson Bay Company. These brave men, weakened by disease and privation, struggled forward on what was probably the most forlorn and awful march in all the annals of exploration. Not one of the 105 ever reached the living world.

The story of this terrible retreat has been deciphered in part from desolate graves and lonely skeletons. Some returned to the ships to die, others struggled desperately to Todd Island; a few may have reached Point Ogle, and even Montreal Island, at the mouth of the river which they sought; but upon all, whether from starvation or disease, fell the white oblivion of death. An old Eskimo woman who

witnessed part of this doomed march said, "They fell down and died as they walked."

No trace of either the *Erebus* or *Terror* has ever been found. From the evidence of Eskimos it appears that one of the ships was crushed, and sank, while the other lay stranded for years on the coast of King William Island, where it proved a mine of wealth to the neighboring savages. McClintock, however, after a thorough examination of all the shores, found no signs of the wreck.

In the death of Sir John Franklin, England lost not only one of her most daring explorers, but a hero conspicuous in her naval annals. His work had found widely separated and varied settings. In the battles of Trafalgar and Copenhagen, in Australian waters with Flinders in the *Investigator,* off the Portuguese coast, in South America, and in his governorship of Van Diemen's Land—throughout all the circumstances of his life he displayed those qualities of coolness in danger and readiness of resource which won him the love and confidence alike of his crews and his associates. His final and disastrous expedition forged the last link in the North-West Passage, as the point reached by the lost ships was within a few miles of the known waters to the westward. On a memorial tablet in Westminster Abbey may be read Tennyson's words:

"Not here: the white North has thy bones; and thou,
Heroic sailor soul,
Art passing on thine happier voyage now
Toward no earthly pole."

CHAPTER IV.

THE FRANKLIN SEARCH.

Section 1. To the mystery that so long enveloped the fate of Franklin and his men the cause of Arctic enterprise is indebted for a new impulse. Public anxiety and private devotion were alike aroused when three years went by with no tidings out of the white silence of the North. The vanished expedition had been provisioned for only three years, and it was clear that neither the erratic game resources of those inconstant regions nor the chance hospitality of the Eskimos could prove equal to the support of 129 men unskilled in the subtleties of the Arctic chase. In 1848 three expeditions were sent to the relief, and in the course of the next ten years, as anxiety grew and the darkness of uncertainty deepened, these were followed by some dozen other carefully organised parties. English, Americans, and even a volunteer from the French navy, joined in the splendid search. When at last the dark and broken story told in the preceding chapter had been pieced together it appeared that the long quest had borne secondary fruit more significant even than the humanitarian purpose which prompted it. During these ten years of heroic activity new lands and waterways had been dis-

covered, and hundreds of miles of Arctic coasts surveyed, some gaps in the known northern shores of America filled in, and, above all, the long-desired North-West Passage had been actually traversed, and at the same time proved impracticable. And far beyond this period, when no lingering doubt existed as to the fate of the expedition, American explorers kept the field in the hope of recovering the ships' records, which might possibly be in the hands of the Eskimos, and which, apart from the popular interest which would attach to them, would doubtless prove most important from a scientific point of view. These latter efforts, however, though determinedly and efficiently carried out, were without success.

The expeditions of the Franklin search fall naturally into three divisions, namely, overland parties through northern Canada, voyages from the Pacific through Bering Strait, and voyages from the Atlantic. Here it will be convenient, however, to disregard this classification, following rather a chronological sequence. The overland expeditions will be described only inasmuch as their work lay in lands north of the American continent, or their discoveries gave any clue as to the fate of Franklin. For the rest they will receive mention later under the head of exploration in Canada.

Section 2. Of the three expeditions despatched in 1848, that under Sir James C. Ross followed the Atlantic route by Davis Strait and Baffin Bay into Lancaster Sound, wintering in Port Leopold, at the

northern end of Prince Regent's Inlet. In the spring Ross's sledge parties explored the shores of this inlet, and much of the eastern coast of Boothia. Not till late in the summer of 1849 did Ross succeed in cutting his ships out of Port Leopold. Then, after building a house and filling it with supplies, he sailed back to England, missing the *North Star,* which had been sent out with provisions to refit his expedition. A co-operating overland party under Dr. Richardson, assisted by Dr. John Rae, was equally unsuccessful.

In the same year a Pacific squadron joined the search under the command of Captain Moore. One of these ships, the *Herald,* under Captain Kellett, touched at an unknown island in the Siberian Sea north of Bering Strait. This sheer and isolated mass of granite received the name of Herald Island, after Kellett's ship. As far as its original purpose was concerned, this voyage was a failure, but it resulted in most important ethnographic studies among the western Eskimos.

Section 3. By 1850 anxiety about the Franklin expedition was at its height. The Admiralty, now thoroughly roused, sent three independent squadrons; a spirit of sympathy on the part of the United States equipped another; while single ships were fitted out in the search by private generosity in Britain and by Lady Franklin herself.

Of all these twelve vessels, only two followed the route from the Pacific. Although these two, the

Investigator and the *Enterprise,* formed one squadron under the command of Captain Richard Collinson, with orders not to separate, their story becomes in reality that of two independent expeditions. M'Clure, in the *Investigator,* ignoring the fleet instructions, declined to wait for his chief at Bering Strait, or to arrange any plan of co-operation. Sailing east to Cape Bathurst and then north, he discovered Banks Land, to the east of which, in an unknown (Prince of Wales) strait, the *Investigator* was beset. In October a sledge party from the ship followed this strait to its northern end, where it gave upon waters navigated by Parry in 1819. Greely says: "This journey established the *then* earliest known existence of continuous water communication north of America, though we *now* know that an earlier and shorter route was discovered by Franklin, 1846–47, in attaining Simpson's farthest."

After nine terrible months of imprisonment in the shifting pack, during which time the destruction of the ship was often so imminent that M'Clure took the precaution of landing supplies on Princess Royal Islands, release came. Then the *Investigator* fearlessly renewed its efforts to push through into the known waters to the north. Failing in this, M'Clure turned back, rounded the south of Banks Land, and with splendid daring forced his way north again along the western coast. On his right, sheer and black and precipitous, menaced the land; while on

his left moved floating cliffs of white and ancient ice, the spectral guardians of the Palæocrystic Sea. Between these threatening jaws of doom the *Investigator* held her course. Osborn says: "Nothing in the long tale of Arctic research is finer than the cool and resolute way in which this gallant band fought their way around this frightful coast."

At the extreme north-west point of Banks Land the *Investigator* was beset for some twenty days, but escaping she made her way into the channel variously mapped as Banks or M'Clure's Strait. On the 23d of September the ship went aground at the entrance of a bay on the northern coast of Banks Land. Here M'Clure wintered, and finding an abundance of game, named his haven "The Bay of God's Mercy." From this place, during the spring of 1852, sledging parties visited Melville Island, explored the north and north-west coast of Banks Land, and following Wollaston Land southward learned from natives that it belonged to the same mass as Victoria Land.

With the brightening summer the outlook for those on board the *Investigator* took on an ever deepening gloom. All summer the ice held relentlessly, and with the returning winter came scarcity of game. The consequent reduction of rations undermined the health of the men, and by the time the long months of darkness lifted the situation had become critical in the extreme. To stay by the ship was to starve. On the third of March, 1853, M'Clure

told off his crew into two parties, and began serving them full rations to restore their strength for the forced retreat which was to begin some forty days later. One party was to push eastward on the chance of meeting whalers from Baffin Bay, the other was to struggle southward towards the mainland and the forts of the Hudson Bay Company. Although under the circumstances this plan offered the only glimmering hope of life, it would in all probability have ended in a second Franklin tragedy.

But salvation appeared from an unforeseen quarter. A squadron under Sir Edward Belcher had the year before been frozen in at Dealy Island, whence an autumnal sledge journey had discovered a record left by M'Clure at Winter Harbour, Melville Island. In the spring of 1853, guessing that the *Investigator* might be still beset in Mercy Bay, Captain Kellett of the *Resolute* sent Lieutenant Bedford Pim to the rescue. On the 6th of April, while M'Clure's men were making a grave, three men and a dog sledge suddenly appeared from the east, and the nearly hopeless crew learned that help awaited them only 160 miles away. Deserting the *Investigator,* they joined Belcher at Derby Island by sledging over the ice of Banks Strait, and were carried to England in the *North Star.* They were thus "the first and last party that ever made the North-West Passage."

Collinson meanwhile, in the flagship *Enterprise,* had followed the edge of the solid pack north of Bering Strait until August 28, 1850, when he turned

south again to winter. The following summer he sailed through Prince of Wales Strait, examining on the way M'Clure's cache at Princess Royal Islands, and reached, August 31st, a point in Parry (or Melville) Sound within 57 miles of the farthest west of Parry in the *Hecla,* 1819, thus nearly connecting the portions of the North-West Passage actually traversed by ships. Retracing his course, Collinson wintered in Walker Bay, on the west coast of Prince Albert Land. Sledge parties explored the north-west coastline of this land, and visited Melville Island, but failed to find traces of the *Investigator.*

During the following summer (1852) Collinson's ship got free of the bay and pushed eastward along the northern coast of America as far as Cambridge Bay at the eastern end of Dease Strait, 69° N., 185′ W. Here the *Enterprise* wintered. In the spring a sledge party under Collinson searched the south-east coast of Victoria Land, and from the farthest point made looked east across Victoria Strait (where one of Franklin's ships had sunk) to King William Land, "unconscious that here lay the unburied skeletons of the men they sought." The state of the ice would not permit of the strait being crossed, so Collinson was forced to turn back, little dreaming he had been so near the solution of the mystery. Although the *Enterprise* did not reach England until 1855, no farther discoveries were made beyond those at Cambridge Bay, where an

engine rod and an article marked with the broad arrow were found in the possession af the Eskimos. As the interpreter was with M'Clure, it was impossible to learn whence these came.

General Greely says: "The voyage of Collinson is one of the most remarkable and successful on record. With a *sailing* ship he navigated not only the Arctic Sea forward and back through 120 (64 one way) degrees of longitude, a feat only excelled by the *steamer Vega*, but he also sailed the *Enterprise* more than ten degrees of longitude through the narrow straits along the northern shores of continental America, which never before nor since have been navigated, save by small boats and with excessive difficulty. Of all government naval expeditions searching for Franklin he came nearest the goal. Collinson's modest journal is characterised by Admiral Richards, one of the few living men fully competent to speak on the merits of Arctic work, as 'a record of patience, endurance, and unflagging perseverance, under difficulties which have perhaps never been surpassed.'"

The other expeditions which left England in 1850 all took the Atlantic route, following Franklin through Lancaster Sound, from which waterway they made the mistake of carrying the search northward into Wellington Channel hundreds of miles from the real scene of the disaster. Among these were two government squadrons commanded by Captain Horatio Austin, of the Royal Navy, and a

whaling captain named William Penny. On the 27th of August Penny discovered Franklin's first winter quarters on Beechey Island, marked by three lonely graves. Word of this discovery was carried back to England by the *Prince Albert,* which Lady Franklin's devotion had added to the search. Penny's squadron, with the *Felix,* which private liberality had put in the field under command of Sir John Ross, wintered on the coast of Cornwallis Land, at the entrance of Wellington Channel. Sledging parties in the spring partially explored Cornwallis Land, and examined a portion of the west coast of North Devon, across the channel. In the autumn the ships returned to England without having discovered any farther traces of the lost expedition.

Meanwhile the chances of the Arctic had dealt strangely with the American squadron. The *Advance* and the *Rescue,* under Lieutenant E. J. de Haven, accompanied by the famous Dr. Kane, were held up by storms in the middle of Wellington Channel, where they were speedily beset. At the mercy of the pack, they were carried north, discovering Murdaugh Island and a wide land beyond North Devon, which de Haven called Grinnell. Then the whim of the floe shifted, and bore them slowly southward. Later, with awful deliberation, the great ice-current set toward the east, pushing them back through Lancaster Sound. During eight months of horrible helplessness they were drifted more than a thousand miles, and when release came in July,

1851, the shattered squadron returned to the United States.

Most noteworthy was the sledging work of the larger government force under Austin. In the early autumn of 1850 Austin's ships were frozen in at Griffith Island, south of Cornwallis Land, and in the spring six sledging parties, of six or seven men each, carried the search far to the south and west. The distances thus traversed amounted to 3,320 miles, of which 670 miles consisted of coasts never before discovered. Among the latter may be mentioned the north half of Prince of Wales Land, whose eastern coast, however, was probably skirted by Franklin. The following autumn, Austin returned to England, having reached the mistaken conclusion that farther seeking to the south must prove futile.

Section 4. In 1851 the Hudson Bay Company organised an overland expedition under Dr. John Rae. Descending to the Arctic Ocean by the Coppermine River, Rae crossed Dolphin and Union Strait, and was the first white man to set foot on Wollaston Land. Later in the same year he examined the east coast of Victoria Land as far north as the 70th parallel. But failing to cross the strait to King William Land, Rae lost his chance of finding the stranded ship, which had not then disappeared. Had he accomplished this crossing it is also possible that he might have been in time to recover the Franklin records. As it was, he found nothing to indicate that he had been near the solution of

the mystery save part of a flagstaff marked with the broad arrow.

This same year the *Prince Albert* was again in the field, but now under Captain William Kennedy, with Lieutenant J. R. Bellot, a volunteer from the French navy. By a long and important sledge journey these men learned that the so-called Brentford Bay, discovered by Ross nearly a quarter of a century before, was in reality a strait. It is now known on the maps as Bellot Strait. This discovery proved North Somerset to be an island, and not an extension of Boothia.

Section 5. In the spring of 1852 the Admiralty despatched five ships of the Royal Navy, under Sir Edward Belcher, with instructions to direct all the energy of the expedition toward the examination of the upper portion of Wellington Strait. Sending two ships under Captain Kellett and Commander McClintock westward through Barrow Strait, with the other three he pushed north. After discovering Exmouth and Cornwall Islands, he wintered in Northumberland Sound, 76° 52′ N., 79° W. Travelling north-east by sledge in the spring he discovered Belcher Channel, proved Grinnell Land an island, and later discovered Buckingham Island. Commander Richards and Lieutenant Osborn, of Belcher's squadron, made important geographical discoveries in Cornwallis, Bathurst and Melville Islands.

Meanwhile, the two ships under Kellett and Mc-

Clintock had wintered at Dealy Island, and in the spring had been the means of rescuing M'Clure's crew, as already told in this chapter (Section 3). Other travelling parties from the ships covered many thousands of miles, completing our knowledge of the coasts of Melville Island, and discovering, still farther to the west, the large island of Prince Patrick. Although the sledging feats of this expedition are without a parallel in Arctic records, all efforts were directed toward regions hundreds of miles from the actual scene of Franklin's disaster. Consequently, splendid as these efforts were, their results were purely geographical, and lifted no gloom from the mystery of the lost ships.

By the 5th of August, 1853, only one of Belcher's five ships had got free of the ice. His resources strained by the rescued crew of the *Investigator,* he feared to face another winter in the pack. Ordering the abandonment of the other ships, he crowded their crews into the *North Star* and returned to England.

The most significant outcome of this step was the remarkable drift of the *Resolute,* one of the deserted ships. Abandoned in 74° 41′ N., 101° W., she was borne uninjured for nearly a thousand miles, through Barrow Strait, Lancaster Sound and Baffin Bay, to be found in 1855 by an American whaler in Davis Strait. She was bought by Congress, refitted, and presented to Great Britain as a token of good-will on the part of the American people. This wonderful voyage of an unmanned ship proved clearly the direction of the current through Barrow Strait.

Section 6. The first tangible information about the fate of the Franklin party was gathered by Dr. John Rae, whose overland expedition of 1853 will be mentioned in its geographical aspects under the head of exploration in Canada. In April, 1854, he met a young Eskimo on the Boothian Isthmus, who had tidings of the lost crews. The gist of this information is stated concisely in Greely's *Handbook of Arctic Discoveries:* "In the spring of 1850 about 40 white men were seen dragging a boat southward along the west shore of King William Land. They bought a seal from Eskimo hunters, whom they told that their ship had been crushed by ice, and that they were going to a land where they could shoot reindeer. Later that spring, before the ice broke up, the bodies of some 30 men were found on the continent, and five on an island a day's march to the northward. This pointed to the Eskimo encampment of Back River and Montreal Island as the places, though possibly they referred to Starvation Cove, of Schwatka, or Todd Island, of Hall, both near the mouth of Back River. The natives reinforced their statements by producing silver with the Franklin crest, which, with other articles, left no doubt that their story was substantially correct, and that the Franklin expedition had perished."

Other relics were recovered from the natives by James Anderson, of the Hudson Bay Company, who descended Back River in 1855. Lacking an interpreter, and unable to cross to King William Land,

Anderson added no definite information to that brought by Rae. To the latter was given the reward of £10,000 offered to any one solving the Franklin mystery. By this award the British Government acknowledged that its connection with this sad search was at an end.

Section 7. Rae's discoveries led to the famous expedition of the *Fox*. Although the Admiralty had ceased from its exertions, Lady Franklin would not rest until the whole truth was known. With the last of her private fortune she equipped the steam yacht *Fox* and intrusted the expedition to the command of Captain Leopold McClintock, who had already won distinction as the greatest of Arctic sledgemen.

Sailing in the summer of 1857, the *Fox* reached the north water of Baffin Bay only to be there beset and carried helplessly south again during eight disheartening months, thus retracing 1,200 miles of her course. But when release came McClintock refitted in a Greenland port, and with unshaken spirit resumed the search. At Beechey Island, near the three graves, he erected a monument to the Franklin expedition. After a baffled attempt to force Peel Sound, he turned back to Port Leopold, on the northeast corner of North Somerset, where he found stores left by Ross in 1849. Thence he sailed south through Prince Regent Inlet, made five strenuous but unsuccessful attempts to push west through Bellot Strait, and went into winter quarters at its eastern entrance.

As early as the middle of February, 1859, McClintock began his spring journeys. With the temperature between 30° and 40° below zero he visited the north magnetic pole, where he fell in with a band of 45 native Boothians. From there he obtained relics of a party of "white people starved upon an island where there is a river." This indicated Montreal Island, at the mouth of Back River. On his return to the *Fox* McClintock had "added 110 miles of new land to the charts," thus completing the coast line of Boothia.

McClintock and Hobson, with sledges, started south again in April, meeting on the way other natives with relics and fuller information. According to these, "two ships had been seen near King William Land; one sank, and the other was forced on the shore by ice and broken up; the ships were destroyed in the autumn, and all the white people, taking boats, went away to the large river, and the following winter their bones were found there."

At Cape Victoria, McClintock and Hobson separated, striking south and west respectively. On the 7th of May McClintock met Eskimos, and bought from them silver plate marked with the Franklin crest. They said that the ship had disappeared, that many books had been destroyed, and that men had died at Back River.

Following the east coast of King William Land, McClintock crossed to Point Ogle, and made a careful examination of Montreal Island which brought to

light only a few boat-fittings. Crossing again to King William Land, he found a human skeleton lying face downward as it had fallen. But the most important finds were made by Hobson. Near Cape Crozier (King William Land) he discovered a boat and sledge, two human skeletons, a quantity of clothing, and many other articles of less significance. West of Cape Felix he found three tents and an English ensign, near a large cairn. Most important of all, at Point Victoria on the north-west coast, he recovered the first and only direct record of the Franklin party that has ever reached the world. The facts revealed by this record are stated in the preceding chapter.

A third sledging party under Young added nothing to our information concerning Franklin, but extended our knowledge of Prince of Wales Land and neighbouring shores. "In all, Young explored 380 miles of new coast, which, with 420 miles discovered by McClintock and Hobson, made a magnificent contribution of 800 geographical miles of new shoreline."

On the return of the *Fox* to England in the autumn of 1859, with the first definite news of Franklin's death and the loss of his men, the tidings instantly flashed over an expectant world, and the long search was at an end.

Section 8. There still remained a possibility that the complete records of the Franklin expedition might be in existence among the Eskimos, and in the

hope of recovering these two other parties entered the field, one in 1864, and one as late as 1878. Both these expeditions were American, and both conducted the search by land.

The first was undertaken by an American named C. F. Hall in 1864. Five years were spent on the Arctic coast of America waiting for the necessary Eskimo aid. During this time Hall gathered from natives much silver that had belonged to the lost ships, and he also filled in a short gap in the known shore-line of Melville Peninsula.

At last he secured the help of ten Eskimos with dog sledges, and started for King William Land. He found there a human skeleton, and met natives who had seen Franklin, and who confirmed what had already been made known. On Todd Island, a little to the south, he discovered a thigh bone.

Nearly ten years later Lieutenant F. Schwatka, U. S. army, with W. H. Gilder, led the last expedition in search of the records. Although this expedition is most notable for the daring of its methods and for the amount of travelling accomplished, it had little bearing upon geographical discovery. No part of the records was found, although many natives were met with who had knowledge of the Franklin disaster. Schwatka's journey closes the long tale of Arctic enterprise which was the direct outcome of Franklin's ill-starred voyage.

CHAPTER V.

FROM 1848 TO 1875.

Section 1. Although discovered by the great navigator Barents as long ago as 1596, and by him mistaken for a part of Greenland, the Spitzbergen archipelago claims an important place in the Arctic records of the nineteenth century. A. W. Greely describes it as the most interesting of Arctic lands. He says: "It is the largest known region of the uninhabited earth; it lies intermediate between the Old and New Worlds, its seas have been the richest in exploitable values, its shores enjoy a climate unequalled for its mildness in such latitudes, and it has served as a base for a larger number of Arctic expeditions than any other country."

Geological evidence shows that Greenland, Franz Josef Land, Nova Zembla and Spitzbergen once formed a single continent, and the fossiliferous deposits of the latter land prove that it at least was then clothed with a luxuriant vegetation. The more recent fortunes of Spitzbergen have known still other changes in their way scarcely less picturesque. In the early part of the seventeenth century, when the shore fisheries of these islands were the richest in the world, there flourished upon one of them, within ten

degrees of the Pole, the astounding Arctic village of Smeerenburg, with a floating population of more than ten thousand. Here were shops, bars, and houses of brick and tile. We are told that "even bakeries were constructed, and, as in Holland, the sound of the baker's horn, announcing hot, fresh bread, drew crowds of eager purchasers." The crowd which flowed through these strange streets was chiefly Dutch, but with it were mingled adventurers from many climes, drawn thither by a whaling industry of almost fabulous richness. For some twenty years the ships of prey hovered by hundreds around these bleak and perilous shores, until the huge creature which they pursued took refuge in the outer seas, and Smeerenburg was no more. Its site is marked by a thousand desolate graves.

Our knowledge of Spitzbergen and its adjacent waters was greatly enlarged by the famous Captain Scoresby in the first quarter of the nineteenth century. But most important of all, from a scientific point of view, has been the work done by Swedish scientists and explorers. Northeast Land, hitherto unexplored, was visited in 1861 by Otto Torell, chief geologist of Sweden, who had previously made most valuable studies of the marine life and geological phenomena of other islands in the archipelago. The expedition of 1864 under Professor Nordenskjöld, the most illustrious Arctic explorer of the century, discovered a new land from the top of a high mountain, but failed to visit it. This expedi-

tion resulted in a map "which delineates Spitzbergen with an accuracy unattained as regards any other Arctic land." Nordenskjöld had already served with Torell on his various expeditions.

In 1868 Sweden dispatched the *Sofia*, Captain F. W. Von Otter, on an attempt to reach the North Pole by the Spitzbergen route. Nordenskjöld was the organiser and scientific head of this expedition. From Smeerenburg Bay the *Sofia* pushed its way among the ice-floes to 81° 42′ N., achieving the highest latitude by ship in the Eastern hemisphere. The scientific observations and collections made during this voyage were invaluable.

Nordenskjöld made another attempt to reach the Pole in 1872, this time by sledging from the north of Spitzbergen. The reindeer which were to be used in this attempt made their escape during a violent snow-storm, and the provisions of the party were depleted by the rescued crews of six walrus vessels beset near Wilde Bay. But in spite of these drawbacks three sledges started northward in the spring of 1873, and after more than three weeks of arduous journeying, in the course of which two of the sledges came to grief, Nordenskjöld reached Phipps Island, on the extreme northern fringe of the archipelago. The ice beyond this point was so rough that it was impassable, and all hope of reaching the Pole had to be abandoned. In his return journey to the ship which he had made his base the explorer crossed the inland ice of North-East Land,

which differs in many peculiar respects from the ice-cap of Greenland. The way was made difficult by dense ice-fogs, which at times filled every hollow with a blind, white obscurity, so that it was impossible, by the eye alone, to distinguish between a slight depression and a yawning crevasse in the ice. At other times: "Along the level ice-surface every puff of wind drove a stream of fine snow-dust, which, from the ease with which it penetrated everywhere, was as troublesome to us as the fine sand of the desert to the travellers in Sahara. By means of this fine snow-dust steadily driven forward by the wind, the upper part of the glacier—which did not consist of ice, as in Greenland, but of hard-packed, blinding white snow—was glazed and polished so that we might have thought ourselves to be advancing over an unsurpassably faultless and spotless floor of white marble." Leaving behind them this beautiful desolation the adventurers reached Wahlenberg Bay by the middle of June, and were greeted by the red Arctic saxifrage in flower at the very edges of the retreating snow.

Section 2. Perhaps the most interesting of all approaches to the Pole is that waterway which tapers from the head of Baffin Bay into Smith Sound, and gives at the northern end upon the unknown waters of Lincoln Sea. To the right of this channel lies the extreme north-western coast of Greenland, to the left that uncharted land which

bears the names of Grinnell, Ellesmere and Grant. For reasons which will appear the whole passage is often referred to as the "American route," but the various sections of it are marked on the maps as Smith Sound, Kane Sea, Kennedy Channel and Robeson Channel. The most southerly part of this vast sea lane was discovered during Baffin's astonishing voyage of 1616, when his audacious little craft pushed its way between Capes Alexander and Isabella, "the Northern Pillars of Hercules," to 78° N. This point was not reached again by any ship until 1852, when the steamer *Isabel*, under Captain A. E. Inglefield, crept forty miles beyond it, but turned back at the inexorable bidding of the ice. By this voyage Inglefield added six hundred miles of coast-line to the charts.

In the following year an American sailing vessel, the *Advance*, under Elisha Kent Kane, succeeded in pushing a few miles beyond the *Isabel's* farthest, just entering that curious expansion of the channel named after its discoverer, Kane Sea. Here the *Advance* narrowly escaped wreck, only to be beset in a little bay on the east coast. By autumnal journeys from the imprisoned ship the party *cached* supplies, with a view to explorations by sledging in the spring. The winter proved a season of scurvy and privation, and the first spring expedition ended disastrously, with the loss of some of the men. Later the surgeon of the *Advance*, Isaac I. Hayes, crossed Kane Sea on the ice, and was the first white

man who ever set foot on Grinnell Land. An exploring party also followed the Greenland coast along the giant front of Humboldt glacier to 80° 35′ N. From here they could see the channel stretching northward free of ice.

Unable to extricate his ship, Kane turned for assistance to Belcher's squadron, which had been sent out in search of Franklin, as already described. Failing in the attempt to reach Belcher, who was four hundred miles away, a party under Hayes started southward for Upernavik on the Greenland coast. After terrible hardships this plan also had to be abandoned, and the men returned to face another hopeless winter. In the spring of 1855 the *Advance* was left in the clutches of the ice, and with Eskimo aid the crew toiled painfully to Upernavik, where they were met by a rescue squadron from the United States. The expedition had carried northward the known shores of Greenland and Grinnell Land, and had brought back a series of observations most important to science.

Section 3. The next expedition by this route left America in 1860, and resulted in much excitement over the supposed discovery of an open polar sea. Dr. Hayes, mentioned in the last section, was in command. Putting his schooner, the *United States*, into winter quarters in a northerly harbour of Smith Sound, Hayes made autumn journeys to explore the mysterious Greenland ice-cap, which he succeeded in traversing for some forty miles from the coast.

During the winter Sontag, the astronomer of the expedition, was frozen to death during a sledge journey. The dogs, upon which the spring work depended, were carried off by disease, and their native driver fled to a death of cold and starvation in the demon-haunted interior. In the spring, after visiting the moorings of the deserted *Advance*, where he found only a wilderness of piled-up ice, Hayes started northward. After forty-seven days of slow and exhausting ice-travelling he was stopped by water-holes. Seeking a lofty headland, he looked northward over the open waters of Kennedy Channel, whose violent tides keep it comparatively free of ice; but to Hayes, possessed by the theory of an open polar sea, it appeared as the realisation of his faith and search. He wrote: "All the evidences showed that I stood upon the shores of the polar basin, and that the broad ocean lay at my feet." Later explorations have revealed the fact that Hayes' latitudes and longitudes are not to be relied upon, and his open polar sea has dwindled to a waterway some thirty miles wide.

Section 4. Two attempts on the part of Germany to reach the Pole by way of the forbidding East Greenland coast are of interest. In 1868 the *Germania*, Captain Karl Koldewey, first attempting this route, was unable to get through the guarding ice-stream. Turning to Spitzbergen waters, the *Germania* reached 81° 05′ N. It then sailed southward through Hinlopen Strait, sighting but neglecting to explore

Wiche Land, an island over whose existence geographers had much disputed.

The second expedition, under Koldewey in the *Germania* and Hegeman in the *Hansa*, proved more conspicuous both for its disasters and its successes.

Misfortune befell it in the separation of the ships. In the early autumn of 1870 the *Hansa* was captured by the drifting pack, which, after a few weeks of seeming hesitation, crushed her. Hegeman and his crew built themselves a house, but the shifting floe proved a treacherous foundation, and life became for them a succession of breathless escapes from the blind resistless forces around and beneath them. For nearly seven months they drifted southward along the sinister eastern coast of Greenland, but after covering six hundred miles by this helpless and perilous method of travel, open water and the ship's boats which they had rescued gave them deliverance.

The *Germania*, meanwhile, had wormed her way through the ice-stream to Pendulum Island on the Greenland coast, where she wintered. With Koldewey was Lieutenant Julius Payer, destined in a subsequent expedition to share in the glory of adding a new and important Arctic land to the maps. These two, by a sledge journey in the following spring, reached a point 77° 01′ N., the highest latitude ever reached in Greenland by way of the east coast. Later, when the *Germania* had broken out of her winter quarters, she discovered Franz Josef

Fiord, through which she sailed far inland between towering walls, cleft in places by huge glaciers and plunging torrents. Over the wild desolation of this scene rose giant peaks, like sentinels of the hosts of Death. One of these, some 12,000 feet high, was named Mount Petermann, after the promoter of the expedition.

Although neither of these German North-Polar expeditions succeeded in carrying the farthest point of human achievement any nearer to the Pole, they made important contributions to our knowledge of the Arctic.

Section 5. First to enter the polar ocean by the "American route" was Charles Francis Hall, an American whose name has already occurred in connection with the Franklin search. Hall made, in this hazardous field, discoveries of wide extent and unusual interest, paying for his achievement with his life.

The *Polaris* left the United States in 1871, and by the late summer of that year had discovered and steamed through Hall Basin and Robeson Channel, but at the mouth of the latter she was stopped by an impenetrable ice-pack. The point reached was in 82° 11′ N., just within the unknown waters of Lincoln Sea, and two hundred miles beyond the farthest made by Kane in the *Advance*. Seeking winter quarters in Repulse Harbour on the Greenland coast, the *Polaris* was caught in the ice-drift and carried fifty miles to the south. At last she

found anchorage under the shelter of a huge stranded floe-berg. With such strange guardianship the little steamer wintered in safety. But the loss of their leader, who had died in November, cast a gloom of discouragement over the expedition.

Hall's death was the result of exposure and over-exertion. In an autumn journey by sledge he had explored a hitherto unknown portion of the Greenland coast, making the remarkable discovery that the great ice-cap terminated on the western coast at Petermann Fiord, leaving several thousand square miles of ground in the extreme north of the continent entirely free of ice. Immediately on Hall's return to the ship from these explorations a fatal illness seized him. Lacking its leader, little was accomplished by the expedition during the succeeding year. In the autumn the *Polaris* turned homeward, but finding her way obstructed by a southward-moving ice-pack, she anchored to this obstacle and drifted with it for two months. One night a storm brought to this strange caravan hideous confusion and imminent peril. Part of the crew, in panic, fled to the ice, and were separated from the ship. The *Polaris,* with the remainder of the men, was stranded on the shore of Smith Sound. Here a house was put up for the winter, and in the spring boats were built, and the homeward track resumed. Before further misfortune had time to overtake these frail craft rescue came in the form of a whaler.

But unique and almost incredible is the story of

those who had fled in the night to the rending pack. It was theirs to experience "the horrors of a mid-winter ice-drift, whose appalling dangers and bitter privations can scarcely be appreciated. Five months later, after a drift of 1,300 miles, the despairing party were picked up by the *Tigress,* off Labrador, 30th April, 1873, not only unreduced in numbers, but with a girl baby born to the Eskimo, Hannah."

To Hall's expedition belongs the credit of completing the exploration of the "American route" into the polar ocean, thereby greatly extending our knowledge of Greenland and Grinnell Land.

Section 6. It fell to the lot of Austria, almost in the last quarter of the nineteenth century, to add a most interesting Arctic archipelago to the known lands of the earth.

In 1872 Count Wilczek sent an expedition to explore the Nova Zembla Sea. In command of the *Tegetthof* was Lieutenant Carl Weyprecht, and with him was Lieutenant Julius Payer, who was to carry out all land explorations. The ship was beset on the 20th of August, 1872, within sight of Nova Zembla. The ice which had gripped her seemed dominated by no particular current, but shaped its course at the bidding of the prevailing winds. Gradually all land sank below the horizon, and the *Tegetthof* was alone upon a desolate sea of ice. Nor was her condition less terrible than desolate. Horrible convulsions at times took hold upon the ice, tossing and crushing the ship, while huge piled-up blocks tot-

tered and menaced above her. And in addition to this the stealthy darkness of winter was closing in. To insure some measure of safety the crew carried materials, fuel and provisions to the main floe, where they built a house.

With the longed-for return of spring came fierce white bears in great numbers to the ship, affording a welcome source of fresh meat. All summer the ship drifted with the ice-field, between horizons barren of any promise of land. Only the comforting sunlight, and the reappearance of the seals and water-fowl, lessened the bleakness of her surroundings. But a day came to shatter the waste monotony of life into eager enthusiasm for the wearied adventurers. On the 30th of August, 1873, a veil of mist was lifted at noon, and far in the north-west the sky-line was broken by the rugged headlands of an unknown country.

The next month was one of impatient waiting until the state of the ice should make possible a sledge journey to the new land. Not until November did they succeed in reaching land, and then only a small outlying island. Then began a longer and more trying period of waiting, until the passing of the second winter should enable Payer to continue his explorations. There was now the haunting possibility that the ice which had brought them to these strange shores might carry them helplessly away again before spring. Payer says: "The reappearance of the sun last year was tantamount to a deliv-

erance from hell itself; but now the sun was nothing to us save as a means to an end. Would it enable us to begin our sledge-journeys?"

The first land exploration was attempted early in March, 1874, with the temperature at 59° below zero. After visiting the lofty table-land of Hall Island the party was forced by the cold to return. Before the end of the same month Payer started again with ten men, and by the beginning of April had discovered and entered Austria Sound. The cold was still intense, and edged with cutting winds. Some of the men, thoroughly played out, were left in camp at Hohenloe Island, far up the sound, while Payer pushed relentlessly northward until stopped by rotten ice at Cape Fligely, 82° 05′ N. Looking north from a height of land, he could see the blue masses of distant mountain ranges lying along the horizon.

Upon the return of this land expedition the *Tegetthof* was still fast in her ice prison, with no apparent prospect of release, and it was decided to desert her. Dragging their boats over the confused and distorted ice was a matter of such indescribable difficulty that it was months before they covered the short distance to the open sea. Then their sufferings and hardships speedily fell behind them. The first hint of returning civilisation was afforded by a party of Russian fishermen on the barren Nova Zembla coast.

Section 7. In 1875 a most important expedition

left England under Captain George Nares, having for its object the extension of Hall's discoveries in Greenland and Grinnell Land, and in the new-found polar ocean beyond. The *Alert* and the *Discovery* sailed unimpeded as far as the head of Smith Sound. There, however, they found no resemblance to the ice-free channel which had led Hall so easily to the verge of the polar sea, but instead an ugly and shifting pack. Nevertheless, by judiciously and persistently seizing his opportunities, Nares worked both ships safely through Kennedy Channel. Leaving the *Discovery* in winter quarters on the Grinnell Land coast, he pushed forward with the *Alert* through Robeson Channel into Lincoln Sea, reaching Floeberg Beach on the northern shore of Grinnell Land. Here he wintered, in 82° 25′ N., 62° W., the most northerly point up to that time ever reached by a ship, and only surpassed at all by the famous drift of the *Fram* in 1895.

After 145 days of darkness and cold the sun climbed again above the horizon, and the spring sledging work was speedily begun. One party under Commander A. H. Markham, with two sledges and two boats, started due north over the frozen ocean, with the intention of reaching, if possible, the North Pole. After more than a month of the most extreme and painful exertion they had gone a distance of only seventy-three miles from the ship. This brought them, however, to 83° 20′ N., 64° W., giving Markham at the time the record for the high-

est northing ever made by man. Scurvy had already broken out among the men, and the return journey became a struggle even more terrible than the advance. By the time the ship was reached one man was dead and two-thirds of the whole number prostrate with disease.

Another sledging expedition under Lieutenant Aldrich, also from the *Alert,* explored 220 miles of the unknown north coast of Grinnell Land. Here, too, scurvy put in an appearance, and the party would have perished but for a timely rescue. Other work by land was accomplished, that of Lieutenant Beaumont in Greenland being of special interest, as it extended northward to the curious ice-free area observed by Hall.

Cases of scurvy becoming alarmingly numerous, Captain Nares extricated his ships and returned to England, having made, both by ship and by sledge, higher northings than had ever before been achieved.

CHAPTER VI.

FROM 1875 TO 1900.

Section 1. It fell to the nineteenth century, and to the man in that century who has perhaps done more than any other for the cause of Arctic exploration, to settle the ancient question of the possibility of a North-East Passage by ship from the Atlantic to the Pacific. Since Willoughby's disastrous but resultful expedition of 1553, efforts had been made by English, Dutch and Russians towards the accomplishment of such a voyage, until by the middle of the eighteenth century the thing was accepted as an impossibility. But when Professor (afterwards Baron) Adolf Erik Nordenskjöld turned his attention to it the question again became a live one.

In 1875 Nordenskjöld, who had already taken part in six or seven Arctic enterprises, took a ship manned with walrus-hunters as far east as the mouth of the Yenisei. This voyage he repeated during the following summer in the face of the most unfavourable ice conditions, and returned by the same course in the early autumn, thus proving the feasibility of a route which, as Siberia develops, promises to be of increasing commercial importance. On the scientific

side, also, these achievements were of great value, as we are told that "the Kara Sea proved rich in individuals and in types, yielding nearly 500 species; from Nova Zembla the species of known insects were raised from 7 to 100, and the knowledge of the vertebrate world of this region was similarly extended."

Nordenskjöld now turned his energies to convincing the Swedish Government that the completion of the North-East Passage had been made a possibility by the use of steam in navigation, with such success that in 1878 he was enabled to start upon the crowning voyage of his life. In the steamer *Vega,* accompanied by a collier and two ships bearing commercial cargoes, the explorer left Tromsö, Norway, on the 21st of July, and by the 19th of August had rounded Cape Chelyuskin, the northernmost point of the Old World. Dropping her escorts at different ports on the way, the *Vega* threaded her course through difficult and ice-clogged seas until stopped by the pack about the middle of September, when only 120 miles west of Bering Strait. Thus, almost in sight of his goal, and in waters which he had hoped to find open even in October, Nordenskjöld was forced into winter quarters. For ten months the unrelenting ice held him in this tantalising position, but when, late in the summer, release came, he lost no time in rounding East Cape, thus accomplishing in a single voyage the long-sought North-East Passage. The stirring news first reached the

world when, thirteen days later, the *Vega* dropped anchor at Oklahoma.

Section 2. The voyage of Commander G. W. De Long, U.S. navy, in the *Jeannette*, 1879–81, is of peculiar interest aside from its tragic ending and its direct geographical results. Crushed and abandoned in the Siberian Ocean, 155° E. longitude, in 1881, fragments of the *Jeannette* reached the east coast of Greenland three years later, carried by the drift of the ice; and this fact had much to do with the inspiration of Nansen's daring experiment in the *Fram*, with which all the world rang but yesterday.

De Long entered the Arctic Ocean by way of Bering Strait, and his first and most startling discovery was of a negative kind. For more than a century there existed a geographical myth of continental proportions, under the name of Wrangell Land, variously believed by some of the highest authorities to extend from somewhere north of eastern Siberia across the Pole to Greenland, or in a more easterly direction toward the American archipelago. The coasts of this supposed continent had been sighted by several whalers in the neighbourhood of 70° N. latitude, but the idea of its vast extent had origin in Tchukchee reports. Intending to winter on this great unexplored land, De Long pushed his ship westward into the pack. The march of the ice-floes carried him helplessly past the north of Wrangel Land, the long-sought continent thus proving to be

only a small island, some seventy miles long by half that breadth.

After two perilous and disheartening winters in the drifting pack, the crushing of the *Jeannette* left her crew, many of them ill and disabled, without shelter on the barren floes. By a terrible journey they reached the New Siberia Islands, whence they attempted to push by boat to the mouth of the Lena. One boat foundered in a storm, and the others got separated, one party under Melville, chief engineer, coming to haven in a Russian village. De Long reached the Lena, but only after having abandoned his boat. Delayed by snow, and by young ice in the streams, and hampered by his sick and helpless, De Long sent two seamen forward in search of aid, while he and Dr. Ambler stayed behind with the disabled men. In spite of the utmost exertions on the part of Melville, who came back to the rescue, De Long and his party perished, and their bodies were not recovered until the following spring.

This disastrous expedition had other geographical results besides the reduction of a mythical continent. Among these were the discovery of several new islands, and the traversing of hitherto unknown areas of the Siberian Ocean.

Section 3. After its discoverer, Payer, no one visited Franz Josef Land until 1880, when Leigh Smith, an English yachtsman, explored its southern island fringe in the *Eira*. Where Payer had abandoned the *Tegetthof* as hopelessly beset, Smith found

an ice-free sea. Continuing his explorations in 1881, he was handicapped by the loss of the *Eira*, which sank near Cape Flora, Northbrook Island. Enough was saved from the yacht to enable her crew to winter without serious hardships, and the following summer they retreated south by boat to Nova Zembla, whence they were rescued by a Dutch scientific expedition in the *Willem Barents*.

Although of some geographical importance, Smith's voyages failed to discover certain conspicuous errors in Payer's chart, and tended to confirm the impression that through Franz Josef Land lay the most promising overland route to the Pole. He discovered new coasts to the west, however, and his observations revealed an unexpected richness in the fauna and flora of this most northerly group of the Old World.

Section 4. Expeditions having scientific research as their primary motive form a phase of Arctic exploration peculiar to and characteristic of the latter part of the nineteenth century. The most striking manifestation of this spirit in Arctic work was the establishment of international circumpolar stations, between the years 1881 and 1883. The origination of this most valuable scheme of concerted action belongs to Lieutenant Weyprecht, of the Austrian navy; and the idea was received with such approval that during the years above mentioned fifteen polar expeditions were sent out to establish bases for the record of scientific observations. Thirteen of these

formed a cordon around the North Pole, for the greater part lying far within the Arctic Circle, while two occupied stations on the Antarctic. The countries which joined in this great work were Germany, Great Britain, the United States, Russia, Denmark, Finland, Austria-Hungary, France, Holland, Norway and Sweden. The many series of observations thus compared and related were of the utmost importance especially those connected with meteorology and terrestrial magnetism. But the only expedition to add striking geographical discoveries to the scientific work which was the main object of the circumpolar stations was that sent by the United States under Lieutenant (now General) A. W. Greely, and this calls for a section to itself.

Section 5. When this expedition took the field in 1881 it consisted of twenty-three men and officers of the American army and two Eskimo. In the sealer *Proteus* this party proceeded through Smith Sound and Kennedy Channel to Discovery Harbour, where a station was established and named Fort Conger. The *Proteus* was sent back, and scientific work and preparations for spring sledging were begun. When the long night of winter broke, disease had carried off two-thirds of the dogs, but the men were all in perfect health.

On the 3d of April, 1882, Lieutenant J. B. Lockwood left Fort Conger on his now famous journey of discovery along the Greenland coast of Lincoln Sea. The difficulties of the march were increased

at first by rough ice and a temperature sometimes as low as 81° below freezing. Later came deep soft snow and blinding storms. Yet in spite of obstacles Lockwood's daily average of travel for the first twenty-four days was nine miles, "the greatest ever made by man-power in a very high latitude on any extended journey." Sending back all his men save Brainard and one of the Eskimo, Lockwood pushed on toward the north-east, crossing in his advance a number of immense fiords which "showed no sign of heading, and clearly indicated a new archipelago intersected by these waterways." Forty days after leaving Fort Conger he reached his farthest point, Lockwood Island, 83° 24′ N., which remained the highest latitude attained by man until surpassed by Nansen. The land upon which he stood was free of ice-cap, while to the north, as far as eye could reach, stretched the frozen ocean, and to the south lay a fiord-pierced region, a confused mass of snow-clad peaks. Yet even here, in this extreme latitude, "foxes, hares, lemmings, ptarmigans, and plants showed a country by no means devoid of vegetation or game."

Meanwhile Greely, by two important sledge journeys, was opening up a most interesting lake region in the unknown interior of Grinnell Land, between the 81st and 82d degrees of north latitude. From the chilly summit of Mount C. A. Arthur, the highest peak in Grinnell Land, he saw a mountainous and ice-capped district stretching to the north,

while to the south-west the country seemed cut by a huge arm of water (Greely Fiord).

In 1883 Lockwood, supplementing these explorations in Grinnell Land, found that the country to the south of Greely's lake region was also ice-capped, the northern edge of this cap being a veritable Chinese wall of ice, whose clean-cut, perpendicular face formed a barrier some two hundred feet in height running with little variation across valleys and mountains. Lockwood succeeded in pushing west along this vast unscalable glacier-edge to the head of Greely Fiord, which proved to be a great inlet of the western sea.

General Greely himself sums up the most interesting features of these discoveries as follows: "The inland journeys of Greely and Lockwood resulted in the examination of about 6,000 square miles of newly-discovered land, which determines satisfactorily the extent and the remarkable physical conditions of North Grinnell Land. It brought to light fertile valleys, supporting herds of musk-oxen, an extensive ice-cap, rivers of considerable size, and a glacial lake (Hazen) of extensive area. . . . More remarkable, perhaps, was the discovery that Eskimo had wintered, as shown by permanent huts, at Lake Hazen,—doubtless a phase of that migration, remarkable for its route and distance over so barren a country, by which the children of the ice passed from the islands of the Parry archipelago to the west coast of Greenland."

The visiting ship failing to put in an appearance at the appointed time, Greely was forced by August, 1883, to start south with a little steam launch, two boats and a dingy. After sixteen days of most difficult navigation, which gave a southing of two hundred miles, the launch was frozen in, and it became necessary to abandon her. Although the shore was only thirteen miles distant, the party struggled for nineteen days with desperate effort before they could make a landing, the drift meanwhile carrying them south to a point half-way between Capes Sabine and Isabella. Near here they found a record from the relief expedition stating that a large *cache* of provisions had been laid down for them at Cape Sabine. Greely therefore pushed north to Sabine, only to find that the rations upon which his safety depended had been removed. Here, on the west coast of Smith Sound, they built a hut of rocks and slabs of snow. Famishing and ill-clad, they worried through another black winter. With spring game returned, but so sparsely that one by one men died of starvation. Yet even in their utmost extremity neither panic nor loss of discipline prevailed. The one man who menaced this solidarity by persistently stealing the seal-skin thongs which were the only remaining food, was shot at Greely's order.

On the 22nd of June, 1884, the long-expected assistance came, in the form of a relief squadron from the United States. It was only just in time, for when rescued, Greely and the other survivors of that

heroic little band were keeping life in their bodies by such nourishment as they could get from plants, seaweed and lichens.

Section 6. The vast sheet of ice, possibly three thousand feet in thickness, which covers nine-tenths of the continent of Greenland, for a long time proved an insuperable obstacle to any exploration of the interior. A picturesque but necessarily futile attempt to cross this inland ice was made in 1728 by an armed mounted force. It was a hundred and fifty years later before, by repeated efforts, explorers succeeded in penetrating some two score miles from the coast. Facts being thus inaccessible, curious theories came into vogue about this mysterious inland country. Scientists pictured it as not ice-capped, but merely ice-girt, the great glacial barriers enclosing a land of wide valleys and luxuriant vegetation, a sort of reindeer's paradise. It is now revealed as a lofty ice-covered plateau, a region of treacherous crevasses, of blue and white desolation, broken occasionally by ice-free but sterile summits, known to the Eskimo as *nunataks,* the haunts of dread beings beyond the pale of humanity.

Explorations by Nordenskjöld and his Lapp skirunners on the inland ice in 1883 led to a daring venture on the part of Dr. Fridjof Nansen five years later, which resulted in the first crossing of Greenland. Nansen and five others, with a limited supply of provisions, landed from a Norwegian sealer on the almost unapproachable east coast. Having

taken this step, their lives depended upon their success in reaching the inhabited western shore. The point at which they took to the inland-ice was 64° 45′ N. After seventeen days of up-hill work among crevasses and plunging slopes they found themselves only forty miles from the coast which they were leaving behind, and the land still ascending. At an elevation of between eight thousand and nine thousand feet they were on the crest of southern Greenland, a broad table-land of comparatively smooth and safe ice. After fifty days of ice-travel the west coast was reached about one-third of a degree south of Godthaab.

This journey with Nordenskjöld's explorations two hundred miles to the north thoroughly exploded the theory, as far as southern Greenland is concerned, of ice-free and fertile regions in the interior. It remained for an American, as described in the next section, to achieve the still more brilliant feat of twice crossing this continent of ice one thousand miles farther north than Nansen.

Section 7. In 1891 Mr. R. E. Peary, U.S. Navy, was put down on the Greenland shore of Smith Sound, where he established winter quarters, and in spite of a broken leg persisted in preparations for his great journey of the following spring. After accumulating supplies at the edge of the inland-ice, which here reached only to within fifteen miles of the coast, Peary began his real journey on the 14th of May, 1892. First he pushed northward, until,

after many detours to avoid fiords and crevasses, he looked off from the northern edge of the great ice-cap, on latitude 82° N. Before him lay "the brown-red, comparatively ice-free land discovered by Lockwood in 1882." Turning south-east, Peary followed the edge of the ice until he reached a large inlet on the east coast, which he named Independence Bay. To the north still stretched a red, naked land. A return journey of about 450 miles, facilitated by the successful hunting of several musk-oxen, brought Peary to Smith Sound.

Returning to the field as soon as funds could be raised, this eager explorer wintered again on the west coast, and early in March of 1894 ascended the inland-ice with eight men, ninety-two dogs and twelve sledges. After an advance of 134 miles fierce storms and unendurable cold descended upon them, killing the dogs and disabling the men. *Caching* supplies and sending back the disabled, Peary struggled on with three picked men for a fortnight longer, but was finally compelled to abandon his sledges and retreat to his base. Indomitable in the face of this failure, he refused to return when the relief ship came to take the expedition back to the United States. Two men, Lee and Henson, volunteered to stay behind with him. With Eskimo aid these three passed the winter without disaster, and in the spring turned again to the ice-cap. Failure again threatened when the pemmican *cache* of the previous year could not be found, but with rash

courage Peary pushed forward, reaching again the east coast at Independence Bay. Here his expedition would probably have come to a tragic end, but for the opportune shooting of ten musk-oxen. As it was, the return journey was "a frantic race against starvation." From their winter camp Peary and his two companions were picked up by the steamer *Kite,* and reached home in the autumn of 1895.

By these two brilliant and daring journeys Peary not only revealed the limits and condition of the ice-cap in northern Greenland, but reached a point on the difficult east coast more than two degrees north of the highest previously achieved on that coast.

Section 8. Meanwhile a daring innovation had been introduced into the methods of Arctic exploration by Dr. Fridjof Nansen. The drift of the *Jeannette,* and the observations of the international circumpolar stations, had convinced Dr. Nansen that the great ice-pack north-east of the Kara Sea set continually toward, and probably across, the Pole. He calculated that this drift would occupy three years before the pack, trending south again, would break up in the Greenland Sea. His idea was to desert his base and surrender himself to this drift, which he hoped would carry him within reach of the Pole.

On the 24th of June, 1893, the *Fram,* specially constructed to court and withstand the terrible grip of the drifting pack, hitherto the *bête-noir* of every

poleward venturing ship, left Norway with a crew of thirteen hardy adventurers. Pushing along the coast of Asia, and through the dreaded Kara Sea, the *Fram* rounded Cape Chelyuskin, whose waters had known no keel before or since the passing of Nordenskjöld's *Vega*. North-west of the New Siberia Islands she sought besetment, giving herself up to the resistless forces which control the moving ice-fields; and in this subjection she was destined to remain for three years. At first it seemed the whim of these forces to shatter Nansen's cherished dream at the very outset, and for months the *Fram* was borne steadily south-east, away from her goal. But suddenly the ice-movement shifted northward, and the vast march upon the Pole began. The disturbances and pressures in the pack were tremendous, but left the little ship unhurt. Nansen tells how, from the deck, he has watched ridge after ridge of huge ice-blocks forced up, creaking and crushing, through the winter darkness around him, with a sound "now like the howling of dogs, now like the thunder of a waterfall." Sometimes the noise was so terrific that the men in their snug cabin could hardly hear themselves speak.

By the spring of 1895 the *Fram* had been carried beyond the highest point hitherto reached by man. But not satisfied with her northward progress, Nansen handed over the command to Captain Sverdrup, while he and Lieutenant Johansen, with dogs, sledges and kayaks, pushed poleward over the ice.

Their plan was, not to attempt to rejoin the *Fram,* but to strike homeward, when forced to turn, by way of Franz Josef Land and Spitzbergen.

By the 7th of April, in spite of rough ice, physical exhaustion, and a temperature sometimes 49° below zero these two reached a point 86° 14′ N. and 95° E., whence they discovered no sign of land to the north. The following day they changed their course toward Franz Josef Land, and by the 6th of August came to an unknown group of four islands, gloomy and glacier-covered, which they named Hrittenland, the home of the princesses in Norse fairy-tales. Reaching Franz Josef Land by a hitherto undiscovered sound leading through a region which Payer, probably deceived by mirage, had charted as unbroken land, Nansen and Johansen wintered in a tiny hut which they built of stones and walrus hides. About the middle of June, 1896, Nansen was astonished to hear the barking of a dog. Going toward the sound, he met Mr. Frederick Jackson, of the Jackson-Harmsworth expedition, and accepted his offer of conveyance to Norway on the yacht *Windward.*

The *Fram,* meanwhile, after drifting to 85° 57′ N. the highest latitude ever attained by a ship, had fought her way out of the ice, and reached Norway soon after Nansen. At her home-coming she was greeted with flags, salutes from the men-of-war, and bonfires of welcome on the heights. Then, Nansen says, "The ice and the long moonlit polar nights, with all their yearning, seemed like a far-off dream

from another world—a dream that had come and passed away."

By thus piercing, to within some two hundred miles of the Pole itself, those fastnesses of the white north which had come to be regarded as practically impregnable, Nansen has made it tolerably certain that the actual Polar regions consist of a deep, eternally restless sea of ice. He says: "The immovable mantle of ice with which the northern end of our globe has generally been supposed to be enveloped has vanished. Everything is drifting, the entire ocean is incessantly moving from one side of the hemisphere to the other, the whole thing is a link in the endless chain of vicissitudes in Nature's perpetual round, and this ice is as restless and inconstant as human theories."

Section 9. Two poleward expeditions by Mr. Walter Wellman, an American, met with misfortune. In his attempt of 1894, Mr. Wellman made a ship at Spitzbergen his base, pushing northward with sledge and boat. But adverse ice conditions, and the loss of his ship, the *Ragnvald Jarl,* forced him to turn back before he had passed much beyond the 81st parallel.

Renewing his efforts in 1898, he made his base in Franz Josef Land. Impatient of the return of the sun, Wellman started north with sledges in the depth of winter, and had reached nearly the 82d parallel of latitude, within 565 miles of the Pole, when he received serious injuries from a fall into a

crevasse, and had to turn back. Two days later a severe earthquake destroyed his sledges and crushed many of his dogs.

By this expedition the eastern limits of Franz Josef Land were explored, and some twenty new islands added to the map of that archipelago.

Section 10. The most eminent arctic authorities concurred in the opinion that Franz Josef Land offered the most promising land route to the Pole, until this theory was put to the test by Mr. Frederick G. Jackson, financially backed by Mr. Alfred Harmsworth. Sailing in the *Windward* in 1894, Jackson built a house at Cape Flora, Northbrook Island, which he made his winter quarters and base of operations. His explorations during 1895 and 1896 proved this land to be anything but a favorable route to the Pole. Zichy Land, which Payer had laid down as "a vast mountainous region," Jackson found to be a group of narrow islands lying between Austria Sound and another main waterway which he discovered and named the British Channel.

In 1897 the most important journey of the expedition was carried out, the extreme western lands of the archipelago being visited, and their coasts laid down. The same year Jackson's explorations were brought to a close by the recall of the *Windward.* Although failing to lessen the distance between man and the Pole, the work of this expedition was most valuable from a geographic point of view. Franz Josef Land as an almost continental

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mass stretching away toward the Pole has been resolved into a confused archipelago of lofty ice-capped islands. Jackson says: "At rare intervals high black basaltic rocks jut out of the ice near the shore, forming the only conspicuous landmarks. In front of these rocks the broken-down débris from the cliffs has formed a plateau or shore, upon which a certain amount of stunted arctic vegetation exists. Here may be found a few poppies, saxifrages, mosses, lichens, etc. Nothing grows higher than six inches from the ground. Everywhere else, with the exception of a few low islands, the ice-sheet dominates. Thick mists generally overhang this land; violent gales are frequent, combined with heavily falling and driving snow."

Section 11. The most daring and unique attempt to reach the North Pole is that of the Swede Andrée. From Dane's Island, in north-west Spitzbergen, he and two companions ascended in the balloon "Ornen" (the Eagle), and were borne by a strong gale into the north. All the details of this rash venture had been coolly and prudently thought out. The ascent was made on the 11th of July, 1897, and at time of writing the only definite word from the aëronauts that has reached the world is a brief message by carrier pigeon, despatched from the balloon on the second day after their departure. The "Ornen" had then reached a north latitude of only 82° 2′, and was drifting eastward. Though rumours have found their way into the newspapers of the

balloon having been seen by natives, now in the Parry archipelago, now somewhere in Siberia, the fate of Andrée and his companions remains a mystery which offers the gloomiest possibilities.

One of the latest Arctic expeditions of the century left America in 1898, under Lieutenant Peary of Greenland fame. Selecting the "American route," he took with him sixty dogs, five couples of Eskimo, and sixty carcasses of walrus. His plan was, having sent back his ship, with the Eskimo and dogs to push onwards to the Pole, devoting, if necessary, several years to this purpose. He returned in 1902, having traced the previously undiscovered northern coast of Greenland, where he stood on the most northerly known land in the world.

In the same year, and following also the "American route," a Swedish North-Polar expedition entered the field under Captain Sverdrup in the famous *Fram*. Its principal object was "to ascertain the extension of Greenland towards the north, to determine the yet unknown configuration of the coast of its mainland, and, if possible, to discover whether this great Arctic land finally breaks into groups of islands in the north." * Sverdrup, too, returned in 1902, having discovered a large unknown island north of the Parry Islands.

* The record "farthest north" (86° 33″) was achieved by the Duke of Abruzzi's expedition in 1900.

PART THREE.

EXPLORATION IN CANADA.

CHAPTER VII.

DISCOVERIES IN THE FAR NORTH.

Section 1. Although the various sections of British North America were not confederated into the Dominion of Canada until periods ranging from 1867 to 1873, throughout these chapters it will be convenient to use the name Canada with its present application even when referring to explorations prior to these dates. At the beginning of the century this vast expanse of flowering prairies, sombre forests and rampired mountains, with its deep northward margin of desolation, was little more than a limitless hunting ground, its plains shaken by the thunder of innumerable galloping bison, with the shrill cries of their red hunters, its northern solitudes traversed by great migrant herds of caribou, its lakes and rivers loud with the whirring flight of water fowl. Into this primeval wilderness the comparatively long-established eastern provinces had thrust a wedge of civilisation, occupying but a trifling fraction of the whole three and a half mil-

lion square miles. Practically all of the coast lying along the Arctic Ocean was utterly unknown save to the Eskimos, and concerning the resources of the great undeveloped interior there was little definite knowledge. Hearne and Mackenzie had made daring and memorable journeys in the north and west, and their discoveries, although inaccurately recorded, had been very extensive. But except for the far-reaching activities of the fur trade, and occasional sanguinary out-flamings of the ancient feud between the Indians and the Eskimos, there was little of the human drama enacting upon all this illimitable stage.

Section 2. To the wide and picturesque organisation of the fur trade must be credited the pioneer work of piercing these fastnesses. Long before the beginning of the century trading posts of the Hudson Bay Company punctuated the wilderness at lonely river mouths, on solitary and inaccessible inland waters, and along the coasts of Hudson Bay. During the early part of the century the North-West Company was also active in the field, and under the stimulus of a bitter rivalry lonely palisaded trading posts sprang into sudden existence, spreading northward to the Arctic Circle and westward even to the Pacific. Thousands of miles of canoe routes and overland trails were established by the ensuing traffic, and to the hardy adventurers of these great mercantile companies belong the beginnings of Canada's western provinces. Although these men

pushed their fearless way far and wide through the gloom of unknown forests and along great water highways where no white man had gone before, exploration with them was altogether secondary to the expansion of the fur trade. Yet it can be said almost without qualification that every organised expedition of discovery to enter these wilds has been more or less dependent for its success upon the existence of the far-scattered forts and connecting trails of the Hudson Bay Company.

Section 3. In 1840 the Canadian Government established the Geological Survey of Canada, under the directorship of Sir William Edmund Logan. Year by year this institution is doing exploratory and topographical work of great importance, incidentally to discovering and making known the resources of the country. For authoritative and final information in regard to little-known sections we are mainly indebted to this most important branch of the Government service. In these chapters, however, its many and important expeditions will not call for specific mention except when their work has opened up wide regions not hitherto traversed by civilised man.

Section 4. The most conspicuous series of Canadian explorations was conducted in connection with the problem of a North-West Passage for ships, the work thus accomplished being greatly extended and supplemented in the same field by numerous relief parties in search of the lost Franklin expedition.

Owing to these two motives it came about that during a period between 1819 and 1855 our knowledge of Canada's most forbidding and inaccessible regions of starved plain and stunted forest was steadily growing, while in the south and west, neglected and practically unknown, lay vast expanses of sun-steeped prairies, flowering glades and luxuriant woodlands.

Section 5. Starting in 1819, an expedition under the command of Captain John Franklin, whose name was destined to become the most famous of all those connected with the North-West Passage, crossed the interior of Canada from south to north, from Red River near the international boundary to the Arctic Ocean at the mouth of the Coppermine. The story of this journey by canoe and on snow-shoes, by men unaccustomed to these modes of travel, is one of intrepid energy in the face of terrible sufferings and loss of life. With Franklin were Dr. John Richardson, midshipmen Robert Hood and George Back, a seaman named John Hepburn, and a number of hunters and *voyageurs.* Reaching Cumberland House after a difficult autumnal journey of 700 miles from York Factory, they started northward again in January. A painful tramp of 800 miles with the unaccustomed aid of snow-shoes brought them to Fort Chipewyan on Lake Athabasca, where a dearth of supplies forced them to push on for Fort Providence on Great Slave Lake. On leaving Providence Franklin's party consisted of twenty-six men and

three Indian women, with provisions for only ten days. Failure of food and scarcity of game shattered their hope of reaching the lower Coppermine by autumn, forcing them to build winter quarters, which Franklin named Fort Enterprise, on Winter Lake. Here their straits were relieved by Back, who retraced his steps to Providence and Chipewyan, returning with food and ammunition after a journey of 1,100 miles on snow-shoes, the temperature at one time down to 90° below freezing, his only covering at night a blanket and deer-skin.

On the 18th of July, 1821, Franklin's expedition reached the Arctic Ocean at the mouth of the Coppermine, 350 miles from Fort Enterprise. Undeterred by the fears of his *voyageurs* and the extreme uncertainty of food and fuel, with splendid daring he pushed eastward in canoes. The shore was barren, the sea rough and encumbered with ice. The coast traversed was unknown land, and it was not until August 22d, 1821, their canoes in a condition of wreck and only two days' rations of pemmican remaining, that the expedition turned back.

Franklin's farthest east on this journey was Point Turnagain, 68° 18′ N., 109° 25′ W. In the face of obstructions and hardships almost insurmountable he had accomplished the delineation of the southern coast of a large sound and the entire shores of a lesser bay, which were named respectively Coronation Gulf and Bathurst Inlet.

It was already too late for the expedition to return by the way it had come, but having discovered Hood River on his outward route, Franklin hoped to ascend this to the head of canoe navigation and thence cross overland to the Coppermine and Fort Enterprise. But disappointment met him here. Hood River developed a series of rapids, falls and cañons which made further navigation impossible while he was yet 150 miles from Point Lake, at the head of the Coppermine. There was nothing to do but cover that distance on foot. From the remains of the boats two small portable canoes were made, and with less than one day's rations left the party started on its forlorn march.

This was on the last day of August. On the 4th of September they were storm-stayed, and for three days remained in camp, without fire or food. On the 7th, after a three days' fast, they made a fire from the fragments of one of the canoes which had been broken in carrying, and ate the last of their food, a few soup-tablets and a little arrow-root. From this time their sufferings were of the extremest kind. Over marshy and desolate country almost entirely barren of game they struggled on. The snow lay a foot deep, but the ice on the streams was still young, and a further strain was put upon their enfeebled vitality by frequent sudden plunges into icy water. The flickering life was kept in their bodies by such nourishment as they could get from lichens, and from bones of animals left by the wolves,

with now and then a stray ptarmigan or the chance luxury of a few berries.

At last they reached the Coppermine, some 40 miles from Fort Enterprise, having lost only one man. Here eight days were wasted in vain attempts to cross the river, which was rapid and unfordable. Franklin finally devised a willow-framed boat covered with canvas bedding, and the crossing was accomplished on the 4th of October. It was then decided that Back and two of the men who seemed most nearly equal to the extra effort should push ahead to Fort Enterprise, on the chance of securing aid for the others.

The diet of lichens and scraps of roasted leather proving fatal to two of the men in the main party, and the others being in the last stages of exhaustion, a relief camp was established at the first place where fuel and lichen could be found in comparative abundance. Here Richardson, Hood and Hepburn remained behind, while Franklin and eight men pushed on. Four of the latter, a hunter named Michel and three *voyageurs,* overcome by exhaustion, returned to camp, where a wretched tragedy ensued. Michel, brutalised by his sufferings, and thinking only of increasing his own chances of subsistence, deliberately murdered Lieutenant Hood and the three *voyageurs.* Crazed with the instinct of self-preservation, the man had become a mere animal, and had to be shot down as such.

The relief camp consisted now of only Dr. Rich-

ardson and Hepburn, who, leaving the scene so stained with slaughter, struggled on toward Fort Enterprise, in the track of Back and Franklin. The latter, with his four men, found the Fort utterly deserted, and a note from Back to say that he was pushing on to Fort Providence for assistance. As Fort Providence could scarcely be reached inside of two weeks, the outlook for the party seemed hopeless. They were joined later at Fort Enterprise by Richardson and Hepburn. There the six men, without strength to push forward, and with no means of sustenance but such bones and skins of deer as remained from the previous year, supplemented with moss and a variety of lichen called *tripe de roche,* waited, enduring a sort of living death, and clinging to a hope so forlorn as to be little more than a mockery.

After two others of their number had perished, salvation came to the brave remnant from an unforeseen source. Back, while yet only a few days' march from Fort Enterprise, fell in with a friendly band of Indians, who, contrary to the uses of that improvident race, were plentifully provisioned. To their chief, Akiatcho, we owe the rescue of one of the noblest and most intrepid explorers our race has produced.

Section 6. In 1825 Franklin led a second expedition from Ontario by way of Lakes Huron and Superior to Red River, thence across country to Great Bear Lake, and down the Mackenzie River to its

mouth, whence he continued the survey of the unknown northern coast of America. Richardson, Back and Hepburn again accompanied him.

After establishing a winter post, Fort Franklin, on Great Bear Lake, from which centre important magnetic and meteorological observations were carried on, and the lake surveyed, Franklin's party found itself in July of 1826 at the delta of the Mackenzie. Here they separated, one body under Franklin and Back skirting the coast westward, another commanded by Dr. Richardson proceeding eastward toward the mouth of the Coppermine. Franklin's division succeeded in tracing the coast for 374 miles to a point which they named Return Reef situated 70° 26′ N. and 148° 51′ W.

Meanwhile Elson, of the Beechey expedition, sent out to meet Franklin by way of Bering Strait, had succeeded in rounding Icy Cape, never before doubled, and had explored an unknown coast as far east as Point Barrow, within 160 miles of Return Reef. Franklin, unable to reach Elson, turned back toward the Mackenzie River and Fort Franklin, where he found Richardson's party, safely returned after a most successful voyage. Amid the Arctic desolation of Atkinson Island they had discovered what was evidently a deserted winter settlement of the Eskimos, consisting of 17 winter-houses and a large log-roofed public building. After rounding Cape Bathurst, they had held south-east across Franklin Bay and along the coast, and had discovered a

new land separated from the mainland by a strait some 15 miles wide. The strait they named after their boats Dolphin and Union, and the new land received the name of Wollaston. Before turning back they had traced the northern coast-line of America through twenty degrees of longitude and two of latitude, besides making many valuable botanical and geological observations. The bands of Eskimos met with during this expedition proved in the main friendly, although inclined to take advantage of any accident or misfortune.

Section 7. In 1833 Captain George Back was again in the field where already he had achieved so great distinction by his courage and endurance. In command of a relief expedition to discover the whereabouts of Sir John Ross he followed a route from Montreal to Lake Winnipeg, thence to Fort Reliance, which he built on Great Slave Lake, and down the Back, or Great Fish River, to the Arctic coast.

The great river which Back followed to the sea, and which now bears his name, had never before been seen by a white man, its existence being known only by vague Indian reports. The actual descent of the river was not begun until the spring of 1834, by which time news had been received of the safe return of Ross's party. But the expedition pushed on to accomplish its secondary purpose of scientific and geographical work.

Back River developed new dangers at every turn.

Its rocky rapids were interspersed with impassable falls, while its more placid reaches often widened out into long ice-bound lakes. Its shores were in the main forbidding, and its generally turbulent nature may be judged from the fact that in the 530 miles between Back's starting point and the river's mouth his boat experienced the perils of 83 cascades and rapids.

Back's explorations were practically confined to this river and to the barren lands lying at its mouth, although he sighted a strait to the eastward, afterwards explored by Simpson, whose name it bears, and an unknown land to the north which he named after King William. This latter was destined later to focus attention in connection with the tragic fate of Franklin's last expedition. An attempt to connect Point Turnagain and the mouth of Back River by a land expedition along the coast failed at the outset, the country being so boggy that the men sank to their knees at every step. Back therefore turned southward again along the difficult river route by which he had come, the ice conditions making any coastwise exploration by boat impossible.

Section 8. The next expedition in Canada had for its object the completion of the discovery and survey of the northern coast, and is remarkable among Arctic enterprises for its great success, and its freedom from serious disaster in spite of unnumbered dangers and difficulties. In 1836 P. W. Dease

and Thomas Simpson were commissioned by the Hudson Bay Company with this undertaking. That winter Simpson, through piercing cold and driving blizzards, made a remarkable overland journey from Fort Garry to join Dease at Chipewyan, covering the 1,277 miles in two months. The route of Dease and Simpson in the early summer of 1837, down the Mackenzie to its mouth and westward as far as Return Reef, broke no new ground.

At Return Reef their discoveries began. Between this reef and Point Barrow there lay 150 miles of unknown coast, along which the explorers pushed their way against vast difficulties, in constant peril from the ice-packs, at times, with their utmost exertions, advancing only a mile a day. At a cape which they named Simpson, within two degrees of Point Barrow, Dease consented to stay with the boats while Simpson and five men pushed along the coast on foot. Two days out they came on an Eskimo camp, from which they succeeded in obtaining skin boats and native rowers for the remainder of the journey, reaching Point Barrow on the 4th of August.

Having thus united the known portions of the north-western coast-line of America, the expedition returned to the mouth of the Dease River on Great Bear Lake. Here they built winter quarters which they named Fort Confidence, and here they spent the time, until river navigation opened, in hunting, fishing and exploring the neighbouring country.

In the early summer of 1838, portaging from the Dease to the Kendall River, and descending the latter stream to its confluence with the Coppermine, they were there delayed by river ice. When at last they reached the Arctic coast the ice conditions were still so bad that by August 9th they had succeeded in forcing their way eastward only as far as Cape Flinders in Coronation Gulf. From this point Simpson again took to the land, leaving Dease to follow by sea when the ice permitted. Passing Point Turnagain, a hitherto unexplored coast lay before him. Following this eastward for 100 miles Simpson found himself on a bold headland, from which he saw to the north an unknown land, and named it Victoria. August being now spent the party returned to winter quarters at Fort Confidence.

By the 22d of June, 1839, they were again at the mouth of the Coppermine. Delayed here by the sea ice, which they found still solid, they filled up the time of waiting with the exploration of Richardson River. When the ice broke they succeeded in reaching Cape Alexander, Simpson's farthest of the previous autumn, as early as July 26th. Here they were again obstructed, but by taking advantage of every opening in the ice they achieved Point Ogle before the middle of August, thus connecting Back's discoveries at the mouth of Back River with Point Turnagain of Franklin to the westward.

Although their instructions were now fulfilled,

Simpson pushed east as far as Castor and Pollux Bay, 68° 28′ N., 94° 14′ W., and returning explored the southern shore of King William Land, which he found abounding in "reindeer, musk-cattle, and old native encampments." Yet it was on this land that the Franklin expedition, nine years later, perished from starvation. Throughout the explorations of Dease and Simpson they found frequent Eskimo encampments and everywhere an abundance of furred and finny spoil. But it is well known that the presence of game is one of the most uncertain factors to be considered in connection with the exploration of extreme northern lands, where all life is peculiarly migratory.

Section 9. In 1846 Dr. John Rae, also in the service of the Hudson Bay Company, left Churchill Station on the 5th of July, with instructions to make Repulse Bay his base of operations, and from there to carry on the exploration of Boothia Felix and the rest of the unknown coast of the continent. Although it was expected that he would be absent on this expedition some fifteen months at the least, and probably nearly twice that time, the promoters of the scheme sent him afield with provisions for only four months, depending for the rest upon the game resources of those most unreliable regions.

Reaching Repulse Bay on July 25th, Rae found some Eskimo who were able to draw him a chart of the country to the north. From them he learned that by following a chain of lakes across the isth-

mus (Rae Isthmus) separating Melville Peninsula from the mainland, and by portaging twelve miles, he would reach salt water to the north. Starting immediately on this route, he reached the southern point of Committee Bay, August 1st. Attempting to skirt, first the west and then the east side of this bay, Rae was in both cases turned back by the ice.

Returning to Repulse Bay, he built a stone house which he named Fort Hope, a makeshift affair with canvas roof and parchment door. The remainder of the autumn was spent in hunting, fishing, and gathering fuel against the long bitter winter. But in spite of their providence, before spring they had suffered much from cold and privation.

Nevertheless, the 5th of April found Rae and his party in good physical condition, and on that day they started with two sledges and eight dogs to explore by land the west shore of Committee Bay. On the 16th of April Rae, leaving his dogs and three of the men behind to rest and hunt, pushed forward on foot. On the 19th he reached a height of land from which he overlooked Lord Mayor Bay, discovered by John Ross more than fourteen years earlier.

After a return to Fort Hope for supplies, Rae started again on the 12th of May to follow the east coast of Committee Bay to the known shores of Fury and Hecla Strait. For the first three days he was supported by a dog team, but for the remainder of the journey travelled on foot, depending mainly

upon his rifle for food. He reached a point within about twenty-two miles of Fury and Hecla, thus practically completing the discovery of the northern coast of America.

Only the north-west shores of Boothia Felix remained unvisited, a gap which was filled in later during the Franklin search. Rae had united the surveys of Ross and Parry, a distance of about 700 miles, had made the first long sledge journey accomplished in that part of the world, and had supported his party for twelve months on the spoil of gun and spear.

Section 10. During 1848 and 1849 an expedition under Sir John Richardson, accompanied by Dr. Rae, made overland journeys in search of Franklin, but these added little to geographical knowledge. In 1851 this indefatigable traveller was again in the field, but this time his discoveries were in lands to the north of the American continent, and located in the Arctic section of this book. Again in 1853–54 we find him wintering at Repulse Bay, living almost entirely on food obtained by the gun, hook or spear. In the spring he succeeded in joining the surveys of Dease and Simpson with those of Ross west of Boothia, and obtained the first scrap of definite information about the Franklin expedition. Murchison River was another of Rae's discoveries on this expedition. The party under Anderson and Stewart, who passed down the Back River in 1855, practically terminates the long wave of overland

Arctic exploration to what is now northern Canada, at that time the territory of the Hudson's Bay Company.

Section 11. During the years between 1863 and 1878 a French priest named M. Emile Petitot, in the course of his service among the Indians and Eskimos, made important geographic and ethnographic contributions to our knowledge of certain little-known regions around the Mackenzie basin and in the neighbourhood of Great Bear and Great Slave Lakes. Other missionaries have traversed the section of Arctic America between Alaska and the Mackenzie River.

CHAPTER VIII.

EXPLORATIONS IN THE SOUTH AND WEST.

Section 1. While strong men were suffering and enduring under frozen skies to make known the secrets of Canada's uttermost north, vast regions of smiling fertility in the south and west remained unexplored. In 1806 Simon Fraser had crossed the Rockies and descended by canoe, through plunging rapids and echoing cañons, the great river which commemorates his name. In 1828 Governor Sir George Simpson travelled from York Factory on Hudson Bay to the source of Peace River, portaged to the great northern bend of the Fraser, and descended thence to the Pacific. Thirteen years later Simpson again crossed the continent by way of the St. Lawrence, the Ottawa, Lakes Nipissing, Huron and Superior, thence by canoe route to Lake Winnipeg, across the prairie *via* the Saskatchewan to the Rocky Mountains, and down the Pacific slope through the valley of the Columbia River.

Section 2. But the first regularly organised effort to gain knowledge of these kindlier regions was made in 1857, at the suggestion of the Royal Geographical Society. This large and important expedition, under the command of Captain Palliser,

remained in the field until the autumn of 1860, exploring the country between Lake Superior and the Rocky Mountains, and beyond. Its work reached north to the sources of the chief rivers flowing into the Arctic Ocean, embracing 30° of longitude and in some places 6° latitude. Not all of this wide expanse of territory was *terra incognita.* In the rich arable lands of the Red River district was the Selkirk Settlement of Scotch immigrants, and northwesterly the country was known along the valleys of the Assiniboine and the North Saskatchewan, the Hudson Bay Company having had for years a chain of forts on the latter river at intervals of about 200 miles, established mainly because of the vast herds of bison which then roamed the prairies and were a source of meat and pemmican for the more valuable trading posts of the far north. The region of the South Saskatchewan, however, was unknown.

Palliser speaks of the territory covered by his explorations as roughly divisible, according to its physical features, into three districts. First, that traversed by canoe route from Lake Superior to Lake Winnipeg, which he describes as a rocky and arduous country, of small promise to the settler. The second, or central prairie district, now one of the greatest grain-producing regions of the world, was crossed by horses and prairie carts. These rolling miles of plain lay in all their virgin loneliness but abundant promise, in summer an ocean of wild

grasses whitening before the wind, or flushed with the innumerable blossoms of the wild rose, in the autumn too often, through the carelessness of Indians or hunters, a racing sea of fire. The river valleys of this region are cut deep and narrow through the soft soil. Palliser's third district was the wide mountain region west of the prairies.

During 1857 the expedition examined the country from the forks of the Red River and the Assiniboine to the international boundary line at Pembina (longitude 97° W.) and along the line to the limit of the fertile belt (longitude 105° W.). Starting again from Fort Ellice it reached the boundary at Roche Percée. On the plains dried buffalo dung, which burns with a hot glow like coal, formed an important item of fuel. In one place the prairie was studded with great scattering boulders of fine red granite, and the sides of these were worn to a polish by the rubbing shaggy sides of numberless generations of bison. Everywhere from east to west the summer twilight of the plains was full of the weird disproportionate booming of the night hawks.

Palliser's explorations during the early summer of 1858 had for their field the country lying between the North and South Saskatchewan. On the North Saskatchewan he was struck with the absence of oaks, ash, elms, maples, and the various hardwood trees that he found on the Red River, "only a few trees of the false sugar maple, from which the In-

dians make a coarse kind of sugar, being found in certain places." The country traversed by the South Saskatchewan or Bow River presented a different aspect, being in the main a region of arid plains, devoid of timber or pasturage. Wild sage and cactus gave the distinctive note of its plant life, except on isolated patches of table-land, where vegetation of a more luxuriant type flourished. The river followed a deep and narrow valley, whose abrupt sides of calcareous marls and clays were baked and seamed by the parching sun.

In August and September the expedition, divided into branch parties, explored the mountains, discovering four passes available for horses between the Kootanie and Columbia Valleys and the plains of the Saskatchewan, all lying within British territory —a point of importance, as the Government was then considering the advisability of establishing a road across the continent to the Pacific. They observed a remarkably fertile belt of country stretching along the eastern foot of the Rockies, to a depth of from 1° to 2° of longitude. This belt, some 2,700 feet above the sea, labours under the disadvantage of light but almost continuous night frosts during the summer, although the winters are more open, and the springs earlier than in the country farther to the east.

During the winter of 1858–9 Dr. Hector of this expedition made a sledge journey over the height of land and down the Athabasca River, while Palliser

spent his time hunting with the Blackfoot and Piegan Indians, dangerous and inconstant tribes whose country west of the Rocky Mountains he was to explore during the following summer.

Early in 1859 explorations were begun in the territory of the two tribes already mentioned, and also through the hunting-grounds of the Blood Indians. Although the expedition had been materially augmented and the men well armed because of the dangerous nature of the country to be traversed, it was with the greatest difficulty that Palliser could induce his half-breeds to proceed. These districts were considered practically inaccessible to white men, the Hudson Bay Company having long ago given up the posts they once held there as too dangerous to maintain. Palliser, however, succeeded in exploring all the British portion of the territory of these tribes without bloodshed or hostilities.

Captain Palliser was assisted on this expedition by Lieutenant Blakiston as astronomer, Mr. Bourgeau as botanist, and Dr. Hector as geologist, with other specialists, so that in addition to the broad and valuable geographical acquisitions accruing, important studies were made of the natural resources of the region. Another object accomplished was the topographical determination of the British North American international boundary line from Lake Superior to the western sea.

Section 3. In 1862 Lord Milton explored the Red River, and with Dr. Cheadle crossed Canada from

the Atlantic to the Pacific. In their own words, "the expedition was undertaken with the design of discovering the most direct route through British territory to the gold regions of Cariboo, and exploring the unknown country on the western flank of the Rocky Mountains, and the neighbourhood of the sources of the north branch of the Thompson River."

Their small party was completed by a half-breed guide, a family of Assiniboine Indians consisting of the man, the squaw, and their son, and an encumbrance in the person of a Mr. O'B., a man whose apt quotations from the Latin poets were never found wanting in the most unexpected emergencies. Before reaching the Rockies they were deserted by their half-breed guide, while yet six or seven hundred miles of the journey lay before them, through a difficult and perilous country of which none of them had any first-hand knowledge. They pushed on, however, relying to a great extent upon the Assiniboine's woodcraft and general knowledge of the wilderness.

At this stage the inefficiency and timidity of Mr. O'B., when called upon to help in the management of the packhorses, and his imperturbable self-confidence when any emergency was past, relieved the monotony with mingled irritation and amusement. While the morning preparations for departure were in progress Mr. O'B. invariably disappeared, to be found at last in some secluded nook, absorbed in a

pocket volume of Paley's *Evidences*. During the day's march he invariably lagged behind; but upon losing sight of the rest of the party it was his custom to collapse upon the nearest fallen tree and lift up his voice for assistance, refusing to budge until somebody came back for him. At night, when it was time to prepare the camp, he would again seek seclusion with his Paley. His lagging on the march was finally cured by the resourceful Assiniboine, who, being sent back to bring the helpless Mr. O'B. to camp, impersonated a "grisly" in the bushes beside the trail with such success that the loiterer rejoined the party at a sprint that might have been the despair of many a college athlete.

Without serious misadventure they crossed the Rocky Mountains by the Yellow Head Pass, nearly 4° north of the American boundary. From the neighbourhood of Tête Jaune Cache, near the headwaters of the Fraser River, they looked out upon one of the grandest panoramas of mountain scenery in the world, hundreds of miles of mountains, packed range behind range, apparently stretching away to the Pacific, most of the peaks snow-clad, and separated only by the narrowest valleys.

This was in British Columbia, a section of Canada which had been lifted into sudden prominence by the gold rush of 1858. Early in the century this giant young province of the Pacific was a sea of pine-clad and snow-capped mountains, interspersed with wild plateau and meadow, its unknown

rivers roaring seaward through dark gorges or rolling between curious triple-terraced banks clothed with the green patches of the bunch-grass.

The famous American expedition under Lewis and Clark in 1804–6 penetrated a short distance into this unknown region, and their tracks were closely followed by the Astor Fur Trading expedition in 1810–11. But the most vital step toward the opening up of this luxuriant wilderness was taken by Sir George Simpson when he established Hudson Bay Company trading-posts in Vancouver Island and on the western slope of the Rocky Mountains. As an outcome of this the Company in 1849 made Victoria or Vancouver Island the capital of its western territories. At this time the province could boast some thirty settlers in addition to trappers, factors, and other Company employés. But when the news went abroad of abundant gold discoveries on the Fraser and Thompson Rivers, and in the Cariboo and Cassiar districts, the lonely cañons and wooded steeps were soon awakened by feverish armies of gold-seekers and adventurers.

Milton and Cheadle's party, soon after entering British Columbia, lost a packhorse in a rapid of the upper Fraser, and with it all the instruments of the expedition. Striking the headwaters of the Thompson, they attempted to force their way north-westward through piled-up mountains and unending pine forests to the gold district of Cariboo. This plan had to be abandoned because of the difficulty

of the country, its mountain barriers buried in densest forest being utterly impassable without the cutting of a trail,—and the axes, all except a small Indian hatchet, had gone with the instruments.

The travellers then decided to push down the valley of the Thompson to Fort Kamloops, near the lake of the same name. All trail failed them, and for a month they were lost in the mountains. Food and ammunition gave out, and a doubt grew upon them as to whether the great mountain torrent within whose gorge they struggled forward was in reality the Thompson. Their course along this deep mountain-walled valley was obstructed by barriers of fallen pines and cedars, their uptorn roots and shattered branches tangled and matted with the tough and spiney vines of the aralia. So nearly impassable was the way to men armed only with a small hatchet and encumbered with horses that their utmost exertions could only accomplish an average of about three miles a day. Throughout this dismal advance they met with only one trace of man, the mummified and headless body of an Indian crouched in a sitting posture beside the finely-broken fragments of a horse's skull.

When, at last, having killed and eaten two of their skeleton-like and utterly dilapidated horses, they emerged from the heavy gloom of the forest into an opener region of grass and sunlight, the party were for a time nearly blinded by the change. Some days before reaching Fort Kamloops they passed the

dead bodies of many Shuswap Indians scattered along the trail, sometimes a man and woman wrapped in the same blanket where they had lain down to die. It was afterwards learned that a fierce epidemic of small-pox had been raging among this tribe. Milton and Cheadle, continuing down the Thompson to its junction with the Fraser, and thence to New Westminster at the mouth of the latter river, had completed the North-West Passage by land through British Territory, although failing of their other purpose to establish a direct route to the Cariboo gold fields from the east.

Since Milton and Cheadle's expedition the province of British Columbia has been threaded in many directions by eager bands of prospectors, in search of both mining districts and arable lands; the Geological Survey has done important and extensive work within its borders; and the Canadian Pacific Railway has supplied an artery along which towns are springing up as in a night. Yet even now civilisation has little more than fretted the margin of this vast congeries of looming mountains and high plateaus.

Section 4. Northward from British Columbia the Rocky Mountains, breaking down from their distinctive rampart-like character into lower hills, traverse a corner of the North-West Territory and turn westward into Alaska. This region, lying west of the Mackenzie River valley and north of the 60th parallel of latitude, can be most conveniently re-

ferred to as constituting one geographical section, and its exploration treated in this chapter, although Alaska is the property of the United States. The Yukon, its principal river, has so great a volume that at its mouth the water is fresh for ten miles out to sea, and 600 miles inland it has a breadth of more than a mile.

This region, but more particularly the neighbourhood of the Klondike River, a tributary of the Yukon, has recently been lifted into conspicuous prominence by vast gold discoveries, rumours of which reached the outside world in 1897, causing an excitement which stirred all civilised countries, and drew the motley ever-restless tide of fortune-seekers into these desolate sub-Arctic wilds. The country along the western coast is wild and mountainous, emphasised here and there with an ominous volcano, and ribanded by hundreds of blue and white glaciers crawling to the sea. Its forests are sombre miles on miles of yellow cedar, spruce, fir, cypress and hemlock, wrapping the mountains to a height of 2,000 feet. Inland, it is a region of tundras and low bare hills, the scant forests clinging only to the river valleys. The gold-bearing section of this country, between the Yukon and Mackenzie Rivers, occupies an area nearly as large as France. In view of the colonising power of gold-reef and placer, and the possible opening of a summer route *via* Bering Strait and Mackenzie Bay, it is interesting to speculate as to what form of permanent civilisation

will take root in this frozen and forbidding land. Already Dawson City, "the San Francisco of the North," has sprung into life at the mouth of the Klondike with a population of about 16,000 people.

The exploration of the northern coast of Alaska had been accomplished eastward as far as Icy Cape previous to this century. From Icy Cape to the mouth of the Mackenzie the coast was explored by Franklin and Beechey, as already narrated. Much information as to the topographical and geological characteristics of Alaska has been collected since that territory was ceded to the United States by Russia in 1867. Portions of the country were also explored by employés of the Russo-American Telegraph Company. To the trapper and the gold-seeker, here as in so many other difficult and desolate regions of America, belongs the credit of having to a great extent broken the way for the attainment of more accurate and official knowledge of these regions.

The native inhabitants of Alaska are more than thirty thousand in number, made up in part of Eskimos and in part of "Indians." The Aleuts are an interesting offshoot of the first-mentioned race, while the so-called Indians belong to three different races, the Haida Indians of Alaska, the Tlinkits of the southern coast, and the Athabascans of the great interior region. Among the Haidas and Tlinkits elaborate totemistic usages are punctiliously observed.

CHAPTER IX.

THE BARREN GROUNDS, LABRADOR AND NEWFOUNDLAND.

Section 1. There remain to be mentioned two wide regions of Canada in which important exploring work has been done during the century. These are the "Barren Grounds" to the west of Hudson Bay and the Labrador peninsula to the east of that water.

The Barren Lands resemble in their physical features the lonely *tûndras* of Siberia, and the kindred tracts in Lapland which received from Linnæus the expressive name of *terræ damnatæ*. They support no trees save where here and there in some sheltered hollow or river valley crouches a grove of ghostly birch and poplar, or a few shivering aspens cling to the meagre soil. The water system is one of vast unsheltered lakes and cheerless rivers. The hills are rocky excrescences offering no adequate refuge from the keen icy winds and driving blizzards with which winter lashes these lands. Then all life seems at ebb between their endless leagues of earth and sky. When the intense northern summer touches them these sullen reaches smile with a beauty that but accentuates their desolation. Their deep blanket of mosses and lichens gives colour effects both soft and

brilliant, with the creamy whites and purple grays of the reindeer moss often touched into daring gaiety by vermilion patches of the cup moss. During the brief sub-Arctic summer small time is allotted to darkness, and the swampy levels make magical response to the flooding sunlight, greeting the long, hot days with a sudden burgeoning of leaf and blossom. The vivid pink and glossy green of the Kalmia, the cup-like bells of the cranberry vines, the dwarf rhododendron, the white blooms of the blackberry bramble, and many less hardy species of wild flowers greet with brave insouciance the fleeting largess of the sun. Several varieties of dwarf weeping willows sweeten the air with their perfume. Here and there, where some sheltered hollow has accumulated a sufficient layer of soil, may even be seen a meadow-like stretch of wild grasses and bents.

Into this mysterious region, whose 200,000 square miles of desolation stretch north of the 59th parallel, between Great Slave Lake and Hudson Bay, the Geological Survey of Canada sent an exploratory expedition in 1893, under the command of Joseph Burr Tyrrell, accompanied by his brother, James William Tyrrell. In the latter's own words: "Of almost this entire territory less was known than of the remotest districts of 'Darkest Africa,' and with but few exceptions, its vast and dreary plains had never been trodden by the foot of man, save that of the dusky savage."

Upon this expedition the Tyrrell brothers had in

their employ three half-breeds and three Iroquois, and their only guidance was a rough sketch-map supplied by the Chippewyans of the Athabasca and Black Lake district. The verbal directions with the map told of a canoe route up stream to the height of land, across which a short portage gave upon a large lake, "from which a great river flows to the northward through a treeless country unknown to the Indians, but inhabited by savage Eskimos." Where this river, the Telzoa, emptied no one knew. The craft used on the journey were two light cedar canoes of the kind known as "Peterboros," and a larger canoe of basswood.

To Black Lake the expedition followed an established route. Leaving this point on Saturday, July 8th, their journey into the unknown began. By a long series of little lakes, minor rivers and short portages, they entered a larger lake whose wide waters stretched some fifty miles to the north. This they named Lake Selwyn, in honour of the director of the Geological Survey. Here a band of Indians were met with who gave information and sketch-maps concerning the rumoured portage over the height of land, but nearly disorganised the expedition by their graphic description of the terrific perils and certain disaster toward which it was travelling. The awful cañons of the Telzoa, and the cannibalistic proclivities of its Eskimo tribes, were described with an eloquence which carried panic to the imaginations of the half-breeds.

The portage proved an easy one, winding between rocky hills, and debouching on the shores of another large lake (Lake Daly), the level of which was some fifty feet lower than Lake Selwyn. In the neighbourhood of Lake Daly were observed curious "Kames," or ridges of clear sand and gravel, sixty or seventy feet in height, and so level and uniform as to suggest ancient railway embankments. On the southerly slopes of these "Kames" were discovered many new varieties of plants. A large part of the country at the north end of Daly Lake consists of frozen bogs, which take on a glacier-like motion and break off into the lake. The brown vertical faces thus exposed for some ten or twenty feet above the water show them to consist almost entirely of frozen moss.

On the morning of July 22d, the expedition discovered the Telzoa, the outlet of Daly Lake, and embarked on its broad shallow rapids. The country, as they sped northward, became a rolling treeless wilderness, the desolate monotony broken occasionally by a solitary white wolf, and once by a great herd of caribou. On August 2d the river opened into a huge frozen lake, whose vast ice-field seemed at first to bar further advance. When the wind permitted, however, they were able to follow open leads between the ice and the shore, in this manner reaching its outlet, the Lower Telzoa, in about eleven days.

The lake thus traversed they concluded to be the

Doobaunt, sighted more than a hundred years ago by Samuel Hearne in his journey to the Coppermine, and vaguely known by tradition to the Athabasca Indians. The shores of Doobaunt Lake are composed largely of a dreary ferruginous conglomerate, and chilly desolation is written on every feature of the landscape. Once, when making a landing, the party was fiercely attacked by a pack of huge grey wolves. The only fuel now obtainable was the white reindeer lichen and another black wiry kind of moss —and these they could rarely find dry enough to burn.

On August 18th, soon after entering the Lower Telzoa, the first traces of Eskimos were met with; and later, on the shores of a magnificent sheet of water afterwards named Aberdeen Lake, were found curious uniform stone pillows, evidently of Eskimo origin, of use or purpose unknown. Several bands of Eskimos were met with, and proved invariably friendly. The Lower Telzoa, now broadened into great lakes, now narrowed into wild rocky cañons, carried the canoes by the 2d of September over its broad shallow delta into the blue waters of Baker's Lake, which empties into Chesterfield Inlet and Hudson Bay. The country of the Lower Telzoa is the home of the curious musk-ox, which has since lured several zealous sportsmen into this hazardous region.

Although now in known waters, the expedition had still before it 500 miles of open coast to skirt in frail canoes before it could reach Fort Churchill, the

nearest abode of white men. The remainder of the journey was a forced retreat for life, the terrible winter of the north closing in at every pause, and clutching for them with stealthy hands of ice. The Tyrrells had travelled 1,650 miles through lands not previously known, and had discovered the Telzoa, a river 900 miles long, whose very existence had never been guessed by the map-makers.

In 1894 Joseph Burr Tyrrell again entered the Barren Grounds, crossing them from the northern end of Reindeer Lake to a point on Hudson Bay about 200 miles south-west of Chesterfield Inlet.

Section 2. The boulder-strewn plateaus and mountains, the swampy and forlorn plains, that characterise the greater part of the north-east peninsular portion of Canada, known in its entirety on the earlier maps as Labrador, are scarcely less desolately forbidding than the famous Barren Grounds. This vast region, in area about equal to Britain, France and Prussia, is traversed by small mountain ranges of barren and ancient gneiss, and the whole surface, but more especially that of the interior plateau, is strewn with innumerable boulders of the same sombre rock, ranging in height from one to twenty feet, and even perched in most erratic manner upon the summits of the mountains. These hills and rocks are the most ancient known on the American continent, being of an origin as remote as the birth of the Rocky Mountains is comparatively recent.

The bays and headlands of the Labrador coasts have long been familiar to the migrant fishing fleets and the boats of the Hudson's Bay Company, but the interior has been very partially explored. Although lying many degrees below the Arctic Circle, a large portion of it being between the same parallels of latitude as Great Britain, the climate of Labrador is noted for its extreme severity. An Arctic current chills its shores, and icebergs, even in midsummer, touch into cold splendour the frowning rock-bastions of the Atlantic coast. Two Moravian missionaries, Kollmeister and Kmoch, explored this coast and Ungava Bay in 1811.

Soon after the amalgamation of the Hudson's Bay and North-West Companies in 1821, trading posts were established in the interior of the peninsula, and much floating information about the "back country" was gathered from the Indians. In 1857 the Hudson's Bay Company had nine of these posts in the interior; to-day all but three are abandoned. In 1838 John McLean, an officer of this company, travelled overland from Fort Chimo at the mouth of the Koksoak to Hamilton Inlet. The following year he attempted the same journey by canoe, but was stopped by the Grand Falls of the Hamilton River. McLean was the first white man to see these stupendous falls, which thunder from a sheer rock platform to the channel, 316 feet below.

Section 3. During the summer of 1861 Mr. H. Y. Hind, accompanied by his brother and two Govern-

ment surveyors, explored the Moisie River, which for centuries had been a thoroughfare of the once powerful Montagnais Indians, whose ancient portage paths were found still clear and well worn. The river having not yet subsided from the spring freshet, Mr. Hind's expedition had much difficulty in passing its first and second gorges. Reaching a tributary of this river named the Cold Water, they ascended its black and sluggish waters through a gloomy defile of frowning purple rocks. Farther north, however, they found this sombre stream beaded with little lakes, full of sunshine and colour and sky, but always haunted by a depressing silence, an absence of any stir of animal life, so that their very beauty weighed upon the heart. The faint delicious fragrance of the Labrador tea-plant in bloom filled the air, and at the portages the terraces of gneiss were splendid with cream-coloured and scarlet mosses. When within a few miles of the source of the Cold Water River the expedition turned back.

The Indians met with by Mr. Hind on this journey belonged to the Montagnais tribe of the coast and the Nasquapees of the eastern interior. The latter in 1861 still held to their pagan religion, the central figure of which was the great spirit dwelling in the sun and moon. In the late winter, between the going of the caribou and the coming of the geese, these Indians of the wild boulder-strewn table-land suffered terrible privations, often living for weeks on a broth of birchbuds and a meagre

lichen known as *tripe de roche,* and being not infrequently driven to cannibalism. From Indians on the Moisie Hind heard curious tales of flashing green "fire-rocks" and "fire-mountains" existing far inland toward the height of land.

Although this exploration was very limited in its scope, covering only about 150 miles of waterway, Hind collected much information during the journey, and his book is still referred to as the standard authority on the Labrador Peninsula.

Section 4. Between 1866 and 1870 a Roman Catholic missionary named Père Babel lived among the Indians and with them explored both branches of the Hamilton River and the headwaters of many of the streams of the southern slope, mapping the country as he traversed it.

In 1884 the Dominion Government sent a vessel under the command of Lieut. A. R. Gordon, R. N., to Hudson Strait, to establish observation stations on both sides of the strait in order to ascertain accurately for what period of the year it is navigable. This, and the supplementary expedition of 1886 under the same command, have significance in relation to the Winnipeg and Hudson Bay Railway, which will have its terminus at Port Churchill, giving a summer outlet for the produce of the North-West, by water route through Hudson Bay and Strait.

Section 5. Since 1857 the Geological Survey of Canada has published many reports by members of

its staff concerning the Labrador Peninsula. The most important and extensive work in Labrador for this department was done by Mr. A. P. Low, whose expedition spent the years 1892–93–94–95 exploring the regions of the East Main, Koksoak, Hamilton, Manicuagan, and portions of other rivers. Mr. Low had already, in 1885, surveyed Lake Mistassini, the largest and best known of the Labrador lakes, and in 1887–88 explored James Bay and the country east of Hudson Bay, drained by the Big, Great Whale, and Clearwater Rivers. Prior to Mr. Low's explorations 289,000 square miles, or more than half the total area of the peninsula, was practically unknown, and there yet remain unexplored more than 100,000 square miles of the northern portion, between Hudson and Ungava Bays. This region is totally unknown save to a few wandering bands of Eskimos who have penetrated inland from the coasts.

The Indians of the peninsula belong to several tribes of the Algonquin family, and according to Mr. Low's estimate number about 3,500, while the Eskimos of the northern and Atlantic coasts aggregate some 2,000 individuals. Mr. Low, during his wide journeyings through the central interior, found the barren surface so chequered with shallow lakes and superficial connecting streams that he considers it possible to travel by canoe in almost any direction across the country, never encountering a portage of more than four or five miles.

Section 6. While not politically a portion of the Dominion of Canada, the iron-bound but fertile island of Newfoundland comes naturally under consideration in this section. Although the oldest British colony, until the last half-century all knowledge of the interior of the island was confined to the Bethuk Indians, a race which, with the once innumerable Great Auk of the coasts, is now extinct, man and bird having perished mysteriously before the inimical presence of the white settler.

The first white man to cross Newfoundland was a Scotchman named Cormack, who made his journey in 1822, from Trinity Bay in the east to St. George's Bay in the west, accompanied only by a Micmac Indian. Having reached the summit of the elevated and forest-clad ridge which walls off the sea from the interior, Cormack looked down upon a wide savannah country, resembling a limitless park, the surface netted with yellow-green lines of path, worn by the countless herds of caribou which fed upon these undulating plains, or rested among the shadows of the spacious groves. The gleam of lakes and winding waters supplied the high lights in this broad and quiet landscape, while certain sharply-peaked isolated summits, or "tolts," lent a curious distinction to the scene.

Cormack spent a month in crossing and examining this savannah region, after which he reached a hilly ridge of serpentine, separating the low slate formation underlying the central plains from a high gran-

itic region in the west. During the sixty days occupied in crossing the island the two travellers supported themselves entirely with the rifle, the wild animals of the interior showing no fear or knowledge of man. Dr. Moses Harvey, writing in 1883, states that to Cormack we are indebted for all we know of the central interior. It was in Newfoundland waters, by the way, that Dr. Harvey, in 1873, discovered the gigantic species of cephalopod, or devil fish, which at the time excited such interest among naturalists.

In 1828 Cormack was the leader of an expedition to Red Indian Lake, to seek a remnant of the Bethuks which it was rumoured still lived in that region. The search was unsuccessful, although many traces of the race which had so mysteriously and suddenly disappeared were discovered. One of the most remarkable of these was a line of deer fences, stretching for thirty miles along the Exploits River, and evidently intended to force the caribou, in their migrations, to cross the river at certain points, where they could be the more conveniently slaughtered.

Section 7. The Geological Survey of Newfoundland, begun in 1864 under the directorship of Mr. Alexander Murray, is still in progress, and has supplied the only definite knowledge of the island's internal resources. The survey has been conducted along the lines of all the principal rivers and lakes, and has carefully examined the coast-line and the adjacent island groups.

PART FOUR.

EXPLORATION IN THE UNITED STATES.

CHAPTER X.

LEWIS AND CLARKE, AND PIKE.

Section 1. The wisdom and foresight of President Jefferson in sending out an expedition, under Captains Lewis and Clarke, to explore the Missouri river to its source in hopes of finding an all-water route to the Pacific, cannot be over-estimated. The exact and detailed accounts brought back by these explorers informed the world of a tremendous undeveloped country rich in all the possibilities of civilization. The "Oregon Country" signified the territory north of what was then Spanish California,—New Spain—and comprehended the vast province of the first expedition sent out by the United States Government. Lewis and Clarke were true pioneers.

Having organized their forces during the winter 1803–4, Captains Meriwether Lewis and William Clarke left Camp Du Bois, at the confluence of the

Missouri and Mississippi rivers near St. Louis,—then a mere village—and started in the month of May on that extraordinary journey which was to bring so large a reward in accomplishment and fame.

Section 2. As the plan of the expedition was for a water route, three boats were constructed; and how thoroughly the leaders realized that they were saying farewell to civilization for many a long moon was evidenced by their choice of cargoes. Arms and ammunition, medicines and merchandise (this last to be used in Indian trade and for presents), comprised the bulk of the provision. Food and clothing for their more immediate needs were, of course, included; but the boats were loaded down with the other necessities, so, outside of emergency supplies, the organizers resolved to depend upon the country before them for their provisions. This confidence in the unknown lands was not misplaced. Throughout almost all their journeyings they found game animals abundant, so that they were able to gather both meat and raiment as they went.

Up the Missouri, against the eager current, striving, mastering, progressing, studying, counselling, reconciling, pacifying, reassuring, went the unwearied band to herald the "Course of Empire" on its western way. At a point ten miles above the great Platte river the expedition at length halted and encamped. There were observations to be made, and maps, and not a few repairs. With such game as deer, bears, beavers, and wild fowl of various kinds, with such

fruit as plums, raspberries, gooseberries, currants, apples, cherries, and grapes, their table was luxuriously supplied. On a high bluff, several miles above the camp, a council was held with the Missouris and Otters, the "White Chiefs" making speeches telling of the new government and its promises of protection, and giving advice for the Indians' behaviour. They also distributed medals, paint, ornaments, and whiskey, which completed the Indians' satisfaction. The scene of this council is now the city of Council Bluffs. Near another bluff, afterwards called by his name, occurred the death of an officer of the expedition, Sergeant Charles Floyd, which was the only loss of the kind during the whole journey.

Passing rich woods, rocky and imposing bluffs, wide prairies, and the mouths of innumerable streams, the explorers again halted a little above the Dakota river. Here they held council with a strong tribe of the Sioux. The men bearing presents from the expedition to the chiefs found themselves obliged by courtesy to feast cheerfully on roasted dog. Here the peace-pipe was smoked; and "Calumet Bluffs" received their name.

Hurrying on, the poor and hilly country drained by the Niobrara was soon left behind for timber lands of red cedar, honey locust, arrowwood, oak, elm and coffeenut. A beaver's dam excited much interest, for the tails of these little engineers were esteemed by the explorers a great delicacy. On the high plains, hunted by their enemies the wolves, the pronghorn

antelopes grazed watchfully. Here also the buffaloes thundered over the levels in battalions thousands strong. And the surly bull elk waved towering antlers from every waterside thicket.

Around the Great Bend, past plains of prickly pear, through fertile lowlands scantily wooded and backed by bare hills, leaving the Teton Indians reconciled and counselled, oft hindered by high winds and shallow waters, they pushed their way steadily. Now they noted fields of Indian corn, tobacco, beans, potatoes, pumpkins, squashes, and watermelons, surrounding the villages of the natives. More councils were held, with the usual exchange of speeches and presents. Most of the tribes begged for whiskey and would have bought it at great price; but the explorers were strictly moderate in their distribution of this perilous luxury, nor would they sell it at any price. Cannonball river was passed and named from the large spherical stones on its shores. Mineral springs of virtue were tasted and noted. Ruined Indian villages were investigated. A fierce feud between the Mandans and Ricaras was healed, and at length, after having covered a distance of about 1600 miles, the expedition delayed to build Fort Mandan, to serve as a winter home.

While the fort was building many visits and presents were interchanged with the Mandans, whose chief village was close by. The explorers noted with interest the curious titles borne by the Mandan chiefs, such as: "White Buffalo-Robe Unfolded,"

"Old Woman at a Distance," "Little Wolf's Medicine," "Wolf Man Chief," and "Cherry in a Bush."

Christmas Day, 1804 (the Fort having been completed the day before), was celebrated by the company with the best dinner their supplies could afford, followed by dancing and games. Trade with the Indians, and hunting, now kept the men wholesomely employed. The Missouri at this point was found to be 500 yards wide, measured on the ice, which soon grew strong enough (with the mercury at 45° below zero) to bear the weight of crossing herds of buffaloes. The meat of these buffaloes, dried and pounded in fat, formed the principal winter food of the Indians, who, though scantily clad, seemed to thrive under the rigours of the season. The temper, traits and trade of these people formed the study of the white men during the five long months spent at Fort Mandan awaiting "open water."

Section 3. The 7th of April found the expedition once more under way. Beyond the creek called Charboneau's no white man had ever ventured,—excepting "two Frenchmen...who, having lost their way, struggled a few miles farther." High, irregular hills emphasised the beauty of the landscape, and more and richer minerals were here in evidence than in the lower country. Much of the ground was crusted by the afterwards well-known "alkali," which in some places spoiled the water; and here, too, the eyes of the men were troubled by the irritat-

ing alkali dust. Captain Lewis explored the valley of the Yellowstone river, and found it a delightful land of mountains and meadows. Not far from Martha's river he killed his first grizzly bear, and wrote the first description ever penned of these ferocious animals. In this primeval land the wild things fed with calm indifference to the approach of men, never having heard the sound of fire-arms. A stream called Turtle creek furnished a feast of soft-shelled turtles,—no ordinary luxury, these!—and, in fact, as far as provisions were concerned, the worn explorers were at this time living like princes.

Now came the crowning triumph of the expedition, —the first sight of the Rocky Mountains (26th of May, 1805)! (Pike first sighted these mountains in Colorado on the 15th of November, 1806.) The great "Continental Divide" was crossed in three different places, many miles apart. At the junction of Maria's river the explorers found it impossible to decide which was the parent stream and which the tributary; so dividing the company they explored both branches. Captain Lewis discovered the Great Falls, on the south branch, and knew that he was on the main stream. Below these magnificent falls a cache was made of such things as were not actually necessary for their forward march. Above the falls new canoes were fashioned from tree trunks, and the journey was continued to Three Forks. These three rivers they named Jefferson, Madison, and Gallatin,

from west to east respectively; and they concluded that the Jefferson was the main river. Up its channel, therefore, they directed their course, excepting a small party under Captain Clarke, which leader, following an Indian road, travelled afoot to where the Jefferson in turn was fed by three confluent streams. Of these latter the discoverers named the northwest branch Wisdom river, kept the name of Jefferson for the west or middle water, and chose Philanthropy to designate the southeast branch.

Continuing still up the Jefferson, but this time with Captain Lewis on land, and Captain Clarke in charge of the canoes, the party reached another "meeting of the waters," which marked the extreme navigable point of the Missouri. One of the two creeks which here united came from the southeast, near what is now Yellowstone Park, and was the real source which the expedition had travelled so far partly to find. This fact was not known, however, at that time, and the other creek, leading from the Great Divide, was the one referred to as the "fountain-head." This water, called Prairie Creek, was explored by Captain Lewis to a point where one of his men with a foot on either side of it thanked heaven that he had "lived to bestride the Missouri!" After climbing up through a gap in the mountains the party arrived at the "dividing line between the waters of the Atlantic and Pacific oceans." Descending the western slope about three-quarters of a mile, they came to a creek of bright cold water flowing toward the sunset,

and tasted the waters of the Columbia river. They were the first white men to reach by land the western slope of the Rockies.

After fatiguing investigation, the way of the Lehmi through Salmon and Snake rivers (all three called Lewis river by Captain Clarke) to the Columbia, was found to be an impracticable one either by water or land. A land journey by some other route was then imperative, the Columbia being their new objective; so, with horses bought from their good friends the Shoshones, the expedition crossed the Rockies by a gap since known as the Lehmi Pass, travelled down the Lehmi to the Salmon, then northward, and over the Bitter Root Mountains to the source of Clarke's river. Down this waterway they moved north to Travellers' Rest creek (now Lon Lon), leaving the Oolashoot Indians after a council and an exchange of courtesies and gifts. The scarcity of game now greatly hampered their progress; and they were compelled to educate their palates to the use of dog flesh, which they could purchase from the Indians.

Up Travellers' Rest creek they moved west, and, again passing over Bitter Root Mountains, came to the sources of the Kooskooskee river (or Clearwater). Following down this river they had a race with starvation till they reached a village of the Nez Percés. Then, "Having been neither frozen nor starved quite to death . . . . the explorers . . reached

navigable Columbia waters by riding and eating their horses."

At Canoe Camp, on the Kooskooskee river, the whole party was ill from famine and unaccustomed foods; but with rest and careful treatment they recovered sufficient strength to build the canoes which were to carry them "down the Kooskooskee, down the Snake, and down the Columbia, to the Pacific ocean." Shooting the ordinary rapids, and carrying the boats around the cascades, the whole company arrived alive and well at the river's mouth, where the waves of the mighty Pacific roared a welcome to the visitors from a distant sister sea.

The principal Indian tribes encountered during this latter portion of the journey were the Snakes, Echeloots, Cathlamahs, Chinooks, Skilloots, and Clatsops (all Flatheads except the Snakes); and the fort which the explorers built at the mouth of the Columbia was named from the last group. Fort Clatsop was completed on the 30th of December, and was occupied till the 23rd of March, the men employing themselves through the winter in hunting, and in dressing skins for clothing. The long return journey was made by water up the Columbia to the Great Falls and thence by land via the Kooskooskee to Camp Chopunnish (named from Chopunnish Indians), where the party remained from the 13th of May to the 10th of June, trading, hunting, and studying the Indians.

Pursuing their way over the Bitter Root Moun-

tains with some difficulty, the expedition was divided to cover more ground; nine men under Captain Lewis taking a course for the Missouri, intending to explore Maria's River, and making the "Lewis and Clarke" pass of the Rockies; while Captain Clarke and his party went south to the Jefferson and descended this stream to Three Forks. From this point he sent a detachment down the Missouri to the Yellowstone confluence, while he explored the latter river. The whole company were reunited on the Missouri; and the rest of the voyage was over the same route which had been covered on the out-bound journey. Their camp at Fort Mandan was found in ashes, having been accidentally burned, and no new camp was made there. St. Louis and home were safely reached on the 23rd of September, 1806; and the most important exploration ever undertaken within the bounds of the United States was brought to a successful close. The explorers had covered in all a distance amounting to nearly a third of the circumference of the globe.

Section 4. In 1805, Lieutenant (afterward General) Zebulon Montgomery Pike was chosen by General Wilkinson, Commander-in-Chief of the United States army, to head an expedition to the sources of the Mississippi river.

The plan of this, Pike's first and the second governmental expedition, was very much like that of the Lewis and Clarke exploration, and both added greatly to the possessions of the United States. While Lewis

and Clarke urged towards the setting sun beyond the Rocky Mountains, Pike pushed northward on his first journey. When they were homeward bound by way of the Yellowstone and the Missouri, he was "pressing on his second way," this time towards the Mexican mountains. And the expeditions led by Pike were second in value as in order only to the vast achievement of Lewis and Clarke.

On his first journey this brilliant young soldier carried the stars and stripes among the British traders, the Sioux, Ojibways, and other Indians of the North and West, and ably represented his government in all the councils and treaties. His other accomplishments, as far as General Wilkinson's aim was concerned, were incidental.

Pike is referred to as an authority on the historical, geographical, ethnological, and related interests in the field covered by his book. Ordered (July, 1805,) to find the source of the Mississippi, to select sites for military posts, to treat with and to make peace if possible among the Indians, and to learn particulars as to the British traders who still occupied posts in the newly acquired territory of the republic, he left St. Louis and ascended the great river. Beyond the village of Prairie du Chien, with the exception of the posts established by the Northwest Company, there were no white settlements on or near the Mississippi, and the American flag had never been unfurled in that part of the country. Pike and his company travelled in boats to the vicin-

ity of what is now Little Falls, but could navigate no farther. So, building a stout stockade and establishing some of his men there for the winter, he struggled by land along the river to Lower Red Cedar lake, to Sandy lake, to Grand Rapids, and Pokegama Falls, to the mouth of Leech Lake river, up the latter to Leech lake, and thence to Upper Red Cedar (now Cass) lake, at the mouth of Turtle river.

Considering the Leech lake drainage area (which Coues calls the Pikean source) to be the true starting place of the Mississippi, "he remained in ignorance of the fact that this river flowed into Cass lake from such lakes as Bemidji and Itasca."

Returning to Leech lake, and thence by a very direct route to the Mississippi in the neighbourhood of Lower Red Cedar lake, he descended the river to his stockade at Little Falls; and the whole company returned safely to St. Louis by the first open water. From observations Pike made during this expedition we obtain our knowledge as to the character of the country, the climate, the game, and the Indians of that period. He contrived a treaty with the Sioux whereby a grant of nine square miles near the St. Croix river mouth, to be used as a U. S. military post, was made in exchange for $2000 and hunting privileges. The peace which he established between the Sioux and the Chippewas was not permanent, however, and it was some time before their strife was definitely concluded.

Section 5. Almost immediately after his return

from the voyage just described, Pike was urged to accept the leadership of another expedition, which was being organized for the purpose of determining definitely the Southwestern boundary of Louisiana, and of attaching the Indians to the Government. This time the young lieutenant was attended by two assistants, Lieutenant James D. Wilkinson of the army, and Dr. John H. Robinson, an enterprising young scientist and volunteer. His company numbered twenty-three white men, besides a few Indians.

Embarking with their supplies in two large boats in July, 1806, the explorers left St. Louis and started on their sail up the wide Missouri into the interior of the Louisiana territory. Passing on his way the Gasconade river, which was too well known to need more than a note, Pike left the Missouri at its junction with the Osage, up which stream he travelled till he reached the Little Osage. Near the mouth of this stream lay the chief village of the Osage Indians. Here he held a council, which was preceded by an exchange of presents, and followed by a feast of boiled pumpkin provided by the Indians. At the Little Osage village a similar council was held, to the satisfaction of the red men, soon after which the expedition left "Camp Independence" and began the land journey with fifteen loaded horses, following the course of the Little Osage river. Such game as deer, raccoon, geese, and turkeys, was the fresh food supply of the party while in this region.

At the chief village of the Pawnees, on the Republican river, near what is now the Kansas-Nebraska line, Pike held a council and succeeded in attaching this important tribe (hitherto under Spanish influence) to the Government of the United States. He also succeeded in healing an old and bloody enmity between the Kans and the Osages, whom he persuaded to smoke the pipe of peace together. Then, turning southward, he reached the waters of the Arkansaw at the point where now stands Great Bend. "There he dispatched his junior officer, Lieutenant Wilkinson, with a few men, to descend the Arkansaw, while with the rest of his company he ascended the same river into Colorado as far as Pueblo. From this point he made an unsuccessful side-trip which had for its object the ascent of the since famous peak which bears his name, and returned to his camp at Pueblo."

Starting anew up the Arkansaw, he found himself arrested by the Grand Cañon at the place where now flourishes Cañon City. Here he turned to the right and journeyed up Oil Creek to South Park, through which he made his further way along the South Platte and its tributaries, through Trout Creek pass, and so back to the Arkansaw. After working up this river about as far as the present site of Leadville, he had the satisfaction of determining its source, after which he returned to his old camp at Cañon City.

Disappointed in having failed to find the sources

of Red River, as he had been instructed to do, "with more courage than discretion," he decided to make another effort before returning to civilization. Following up another branch of the Arkansaw, called Grape Creek, he entered the Wet Mountain valley, where the party endured untold sufferings from cold and starvation. From this harsh neighbourhood he made his way over the Sangri de Cristo Mountains into the San Luis valley. Here, along the banks of the Rio Grande del Norte, he found fertile plains well stocked with game, and a country which seemed to the famished and frozen travellers an earthly paradise. Here he built a stockade, and waited for his sick to recover from the effects of their hardships.

The reason for Pike's presence in Spanish New Mexico has never been explained by historians, and certainly was not understood by the Spanish Governor, General Allencaster. By his order a force of Spaniards "invited" Captain Pike and his party to visit Santa Fé. Virtually a prisoner, he accepted the inevitable, and was conducted from his strong stockade to the capital on the 27th of February, 1807, philosophically making the most of his opportunities to study the country *en route*. Not feeling himself competent to decide the points at issue, the governor ordered Pike under escort to Chihuahua, where General Saledo, the Commandant-General, dealt with the problem firmly. After confiscating all Pike's papers, he gave him hospitable entertainment, and then sent him back under military escort, through Texas, to the American boundary.

CHAPTER XI.

OTHER EXPLORATIONS IN THE UNITED STATES.

Section 1. In September, 1810, Mr. John Jacob Astor, having planned an expedition "to establish a line of trading posts along the Missouri and the Columbia to the mouth of the latter, where was to be founded the chief trading post or mart," formed an association with the title "Pacific Fur Company," and furnished a ship named the "Tonquin," which, under the command of Lieutenant Jonathan Thorn, U. S. N., set sail for the mouth of the Columbia. In July of the same year, a land expedition, headed by Wilson Price Hunt, started from Montreal with the same objective point in view.

The "Tonquin" anchored in Baker's Bay, inside Chinook Point, towards the end of March, 1811. Early in April a party from the ship encamped near Point George, the site chosen for a fortified post to be named Astoria. Crowds of Indians of the Chinook tribe visited the camp and paddled to the ship in canoes, to gratify their insatiable curiosity with the small excuse of a few skins for barter.

A party of the traders, exploring the lower Columbia in the footsteps of Lewis and Clarke, and seeking

suitable places for other trading posts, found the Chinooks, Clatsops, Wahkiacums, and Cathlamahs, with whom they came in contact, very friendly and inclined to favour their enterprise.

As soon as Astoria was well established, the "Tonquin" left the mouth of the river with twenty-three persons on board, and sailing north arrived at Vancouver's Island. Here the ship was visited by a number of Indians who brought otter skins to trade. For these furs, however, they demanded such a price that Captain Thorn was enraged, and roughly drove the bargaining chiefs from the deck. The insult brought down upon the whole ship's company a terrible revenge. On the following morning, a large party of Indians, with war clubs and knives hidden under their blankets, gained access to the deck on pretext of trade, and butchered the unsuspecting white men before they could make any effective defence. After the savages had left the ship, the ship's clerk, one Lewis by name, though mortally wounded, recovered consciousness and planned to avenge his comrades. On the following day the Indians, thinking that no one was left alive on board, returned to plunder the ship. Then Lewis put a match to the powder magazine, and carried to death with him more than a hundred savages. Only the interpreter escaped to tell of this tragedy.

At Astoria the news aroused in the traders a fear for their own safety. So few, so far from help, so surrounded by treachery and distrust, they knew that

they held their lives on the frailest tenure. Their ascendency, however, was firmly established by means of a shrewd stratagem. They showed the Indians a corked bottle, supposed to contain smallpox, of which the Indians dwelt in mortal terror. They promised to keep the cork in the bottle as long as the Indians behaved themselves properly; and from that day the Indians were on their good behaviour. Thus secured, and snug in their completed fort, the company settled themselves to pass the winter, with the hope of welcoming Hunt's expedition hand in hand with spring.

Leaving St. Louis on the 21st of October, Hunt's party started up the Missouri on their long march to the Pacific. Reaching the mouth of the Nodowa, and finding game plentiful and the season far advanced, they went into camp for their first winter, which passed without event. The arrival of spring (1811) at this camp was signalled by a visitation of "prodigious flights" of migrating pigeons, the noise of whose wings on rising from their feeding grounds was "like the roar of a cataract." So numerous were they that one zealous hunter killed nearly three hundred in a morning.

Open weather being assured by the return of birds and flowers, Hunt broke camp and continued on his way, employing four large boats to carry his company of about sixty persons. This part of the journey was through a picturesque region, where alternation of forests and plains, hills and lowlands, kept

the interest of the travellers alert. "The prairies bordering on the river were gayly painted with innumerable flowers, exhibiting the motley confusion of colours of a Turkey carpet," and the region was termed from Hunt's description a "vast realm of fertility."

The 10th of May brought the expedition to the village of the Omahas, where they received a friendly welcome; and a little later at the home of the Poncas a like kindliness greeted their approach. But in passing through the Sioux country many precautions were taken against surprise, for rumours of their hostility were everywhere encountered. When, however, the company came suddenly upon a Sioux war party, nothing more injurious than an overdose of nicotine through too much peace-pipe smoking was the actual result. The Sioux were all friendliness, once the object of the white men's journey had been explained. Another war party, consisting of Ricaras, Mandans, and Minnetarees, was met with soon after this; and with these tribes there was no great difficulty in maintaining that peace which had been so strongly advocated by Lewis and Clarke. Indeed, if all white men had dealt as bravely, generously, and yet uncompromisingly with the Indians, treachery and hatred would have been replaced by mutual confidence and good will. At the Ricaras' village the boats were abandoned for horses purchased from the natives. A route generally southwestward, crossing many affluents of the Missouri,

now led the expedition through a hunter's paradise, where buffaloes, antelopes, and elk ranged freely; then out across an arid desert, where a meat famine was with difficulty endured; and at last to a fork of Powder river and a rich and grassy oasis thronged with game.

On the 30th of August, after a march of nearly four hundred miles from the Ricara village, the expedition made camp at the foot of the Rocky Mountains, which were called by the Indians of that region "the Crest of the World." From this camp they were escorted through the mountain passes by a company of the Crow tribe, who sold them fresh horses and a supply of furs against the cold of the high altitudes.

The next tribe to be encountered was that of the Shoshones, who, with some Flatheads, were hunting in the mountains, and who showed themselves actively friendly. For some days after leaving their kindly hosts, Hunt followed the course of Bighorn river (whose watershed, as he had been told, was also that of the Columbia), and presently found himself at the headwaters of the latter river. This point attained, he congratulated himself that the worst of the journey was accomplished, little dreaming of the terrible struggle yet before him.

At Fort Henry a water route was decided upon by vote, and canoes were immediately constructed and launched on Henry river. But after a short voyage the expedition found itself involved in the perilous

rapids and cascades of the Snake; and after a succession of exhausting portages the water route was abandoned as impracticable. No horses were to be obtained, and the party had to struggle forward on foot. So, through the wild mountain winter, through almost incredible hardships, of famine and frost, across a country never before traversed by white men, the adventurous band struggled on, and reached Astoria on the 15th of February, 1812. For nearly a year the little company of exiles in the fort had been awaiting them.

On the 29th of June, 1812, Robert Stuart set out with six men to make the return journey and carry the news from Astoria to New York. By the 30th of December he had reached the Platte river, after bitter hardships; and there, finding buffaloes and elk for their needs, he encamped for the rest of the winter, celebrating New Year's day with a feast of buffalo tenderloins, tongues, humps, and marrow-bones.

Section 2. It is not the fact that Lewis Cass carried out successfully an exploring expedition which he himself led while in office as Governor of Michigan, but that under the circumstances he should have considered the possibility of joining at all in such an enterprise seems to be astonishing!

Accompanied by Henry Rowe Schoolcraft,—a naturalist in the broadest sense of the word—with a party of thirty-six followers, including Indian guides, Governor Cass left Detroit on the 24th of

May, 1820. The mode of travel chosen was by canoe, of which form of conveyance Gouverneur Morris once wrote, "its slender and elegant form, its rapid movement, its capacity to bear burdens, and to resist the rage of billows and torrents, excited no small degree of admiration for the skill by which it was constructed."

Passing through the St. Clair river, Schoolcraft noted that "it is difficult to imagine a more delightful prospect than is presented by this strait and the little Lake St. Clair." The banks were nobly wooded, and the open lands "rich and handsomely exposed to the sun." After leaving Lake Huron, by way of Sault Ste. Marie, the party camped on Mackinaw Island, which they esteemed principally noteworthy for the delicious fish which the waters of its vicinage afforded them. Here the Governor augmented his company by the addition of ten American soldiers. Then he held a council with the Indians near the Sault, and arranged by formal treaty for a grant of land at this desirable point, to be used as a United States military post. In payment for this grant the Indians received a liberal allowance of blankets, knives, silver ware, cloth, and other articles of value in their eyes.

Along the south shore of that greatest body of fresh water on the globe, Lake Superior, the expedition gathered specimens of native copper, opals, quartz, carnelians, jasper, agate, and other minerals; and the Indians conceived a naïve idea that the white

men were able to turn "all minerals into either money or medicine."

Owing to the difficulties of progress on the St. Louis river, the company was now divided, one half pressing forward by land, while the other struggled on by means of many portages, down the Savannah to Sandy Lake. Reuniting their forces here, they held a council with the Sandy Lake Indians, won their friendship, and arranged terms of peace between them and their enemies the Sioux.

From Sandy Lake river Governor Cass explored the Mississippi toward its headwaters as far as the lake which bears his name, and which he believed to be the source; and then returning down the river, he carefully recorded its features as far as Dubuque. Reascending the river to Prairie du Chien, the expedition went up the Wisconsin and portaged over to the Fox river. Now they were on the waters of the Lake Michigan basin, in a region where the rivers ran through vast fields of wild rice, the resort of innumerable game birds.

Once more dividing his company, Governor Cass decided to cross the peninsula of Michigan on horseback while a party under Schoolcraft should survey the shores of the lake by water. Much was said in favour of the country about Chicago, as to its beauty, fertility and mineral value, and some intimation as to its future greatness seems to have been borne in upon the imaginative explorer. Schoolcraft and his water party returned to Detroit by way of Lake

Huron, reaching that city in safety, on the 23rd of September, with a treasure of exact knowledge as to the ethnology, botany, zoölogy, and the geology of a considerable part of the "New Country."

Section 3. As the Rocky Mountains had been scarcely more than discovered by the year 1819, the Secretary of War, Calhoun, organized an expedition to explore them. The command of this expedition he gave to Major Stephen Harriman Long, who had done good work in 1817 in reporting the conditions at the Falls of St. Anthony. On the 5th of May a start was made from the city of Pittsburg. An important object of the enterprise was to obtain exact topographical knowledge of the country watered by the Mississippi and its tributaries. Accompanied by a physician and ethnologist, a botanist, a geologist, a sketch artist, and a military escort, Major Long embarked in a steamboat especially built for the expedition, and started down the Alleghany. Ascending the "Father of Waters" to St. Louis, the company added to its supplies, and continued its way via the Missouri. At St. Charles some of the party disembarked, and on horseback pursued a nearly parallel path as far as Franklin, at which point the party sustained a great loss in the death of Dr. Baldwin. According to the records of the journey the country along their route was characterized by "continuous ridges, which, in their course across the valley of the Missouri, occasion the alternation of hill and plain."

At Isle au Vache a council was held with the

Kansas Indians, which resulted in their promise to keep the peace. But in spite of pledges a party of Pawnees soon after this robbed the land division of its horses and baggage, and turned it back from the Indian villages. A French trader however came to the rescue. He provided the sufferers with two horses, and guided them back to Isle au Vache, whence a hurried journey to the mouth of Wolf river enabled them to rejoin the main company.

After exploring the Missouri as far as Council Bluffs, the expedition made camp for the winter at a place which they called Engineer Cantonment. There treaties were entered into securing the friendship of the Otters, Missouris, Iowas and Pawnees; after which Major Long left the expedition and returned to Washington. During his absence the villages of the Omahas and Pawnees were visited and studied, and much new material was gathered for future use. Such studies and observations kept the men at the camp profitably occupied throughout the winter; but with the coming of spring they were aroused to more active enterprises.

Major Long, meanwhile, had accomplished his journey to the east. He returned to St. Louis on the 24th of April, 1820, procured horses for a land journey to Council Bluffs, and reached the post safely on the 27th of May. Leaving a handful of men in charge of the steamboat, the expedition moved westward on horseback to the Pawnee villages on the Long Fork, then southward to the main stream of the Platte

river, and along its valley, toward the Rocky Mountains, which were sighted on the 4th of July. Many of the peaks were climbed only to find them backed by others still loftier, till the "highest peak" mentioned by Pike was sighted and named in honour of Major Long. Another snow-capped giant received the title "James Peak," from the fact that Dr. James made the ascension of its forbidding front.

On the 24th of July the expedition was divided in order to cover more ground. A detachment under Captain Bell made an exploration of the Arkansaw river, meeting Kiowa, Kaskaia, Arrapaho, Cheyenne, Osage, and Cherokee Indians; seeing troops of wild horses, hunting herds of bison, and pressing onward always in the direction of Belle Point. The other division, conducted by Major Long himself, desiring to explore the Red River, but being unable to obtain a capable guide, journeyed some distance down the Canadian before discovering their mistake. It being too late in the season to remedy the error, this division kept on to meet the first party at Belle Point. This rendezvous was reached by Long on the 13th of September, with all his party in good health in spite of such minor annoyances as thieving Indians, alkali dust, crystal springs that ran brine, and wood-ticks that ate into the travellers' skins. Captain Bell and his party had arrived four days earlier.

Gratified by the results of this expedition, the Government felt encouraged to explore its territories further, and Major Long was again commissioned to

lead the way. This time the route was from Philadelphia over the Alleghany Mountains to the Mississippi; thence along the tributary known as St. Peter's (now Minnesota river) to its source, Big Stone Lake; then to Lake Traverse, the source of the Red River of the North; down the latter stream to Lake Winnipeg, and finally back east by a long alternation of watercourses and portages, to and along the north shore of Lake Superior, and through Lakes St. Clair and Huron over the course already traversed by Schoolcraft.

On the 30th of April, 1822, the party set out from Philadelphia. The first of their observations were devoted to the geology of the Atlantic watershed, where coal, salt, and iron mines occupied their interests. In the western part of Ohio they noticed the heavy growth of forest trees, including oak, ash, elm, hickory, sugar-maple, black-walnut, beech, wild cherry, cottonwood, and tulip-trees; and here the relics of the mound builders were examined with some attention, and ascribed to the Indians. Fort Wayne they found serving as a trading rather than a military post, and the various tribes resorting thither were studied carefully. The vicinity of Chicago, "one of the oldest settlements in the Indian country," appeared to the party very disappointing as not equalling in any respect the expectations excited by the praises of former travellers; but on the way to Prairie du Chien their spirits were raised again on finding it the most agreeable and

comfortable stage of their journey, nor were they lowered by the rudeness and cheerlessness of the fort itself, and the unattractiveness of the village. Over a rough and hilly country, beset with unexpected obstacles which caused their horses much suffering, the party pushed on towards the falls of St. Anthony.

The 28th of June brought them into a beautiful valley within sight of the Mississippi, and "a landscape was presented that combined grander beauties than any . . . ever beheld; far as the eye could follow were traced two gigantic walls of the most regular outline, formed, as it were, by successive faces of pyramids. Between them extended a level verdant prairie, the scene of the Python flexures of the Mississippi." Major Long held a council with the Sioux at their village near the place and left them wholly pleased with the treatment, presents, and promises of the white chief, given on behalf of his Government. All the expeditions in the western United States had complained of the annoyance of mosquitoes; but it remained for Major Long's party on the journey up St. Peter's River to find them an unmitigable torment.

It was on this river that the company, being feasted by the Indians, first tasted buffalo meat. The meat had been "jerked." And now boiled into tastelessness and served without salt, it was pronounced "flat, stale, and unprofitable." Referring to another disappointment their historian wrote pathetically, "We were not so fortunate as to meet

with those apples, plums and other good things, which grew spontaneously sixty years since in the country." Within three miles of Big Stone lake was found the head of Lake Traverse, both bodies of water being in the same valley. The division between was but slightly above their level, so that in times of flood the two were wont to unite. So trifling an elevation was it that availed to determine the divergence of two mighty rivers to opposite corners of the earth,—on the one hand the Mississippi seeking the Gulf of Mexico, on the other hand the Red River, journeying to the arctic desolation of Hudson Bay.

By the way of the Red River the travellers reached Lake Winnipeg, the northernmost point of their journey, and, after paying a visit to Fort Alexander, turned their faces homeward on the 20th of August. Through a chain of lakes, rivers, and portages, they arrived at Fort William, to record the remarkable fact of having seen neither Indians nor quadrupeds since leaving Rainy Lake. Embarking at Lake Superior they traversed water so transparent that the canoe appeared as if suspended in the air, and "the spectator, who remains too long intently gazing at the bottom, feels his head grow giddy, as if he were looking down into a deep abyss."

At Cantonment Brady (at Sault Sainte Marie), under the command of Major Cutler, U. S. I., the party met Mr. H. R. Schoolcraft, who was there in the capacity of Indian agent, and who added consid-

erably to their store of information concerning the regions adjoining their route.

Bronzed, bearded, and in vigorous health, the travellers reached Philadelphia on the 26th of October, after six months of exploration destined to bear rich fruit in the future development of the northwest.

Section 4. In the tremendous ruins of the mound builders, scattered over the United States from the Great Lakes to the Gulf of Mexico, from the Rocky Mountains to the Atlantic Ocean, may be said to exist the alphabet of an extinct people with which some skilful archæologist will contrive to read the history and ethnology of a race profoundly alien to the modern world.

These mounds, of which the greatest numbers are to be seen in Ohio, Tennessee, and Kentucky, are very little known even at the present day, and in fact were scarcely subjected to any intelligent observation till the middle of the century. Isolated and grouped dwellings, worship and burial places, and fortifications, excited the curiosity of the earliest white settlers, but no systematic attempt at unearthing their mysteries was made before 1848, in which year Squier and Davis examined the "Ancient Monuments of the Mississippi valley." At about the time that the Kentucky State surveying expeditions reported upon such of the remains as lay in the path of their general explorations, men of learning at last began to busy themselves to gain some definite knowledge of the vanished people who had left such

significant monuments behind them. All this delay was in spite of a certain interest excited from time to time by individual effort,—such as the careful survey of "Fort Ancient" by Professor Loche about 1840. Atwater, writing on the antiquities of America, suggested that the builders of these earthworks and fortifications commenced at the head of the northern lakes and worked along down in a southwesterly direction to the City of Mexico, where "they had their central seat and radiated into Central and South America."

Prof. Samuel Park devoted much time to the exploration of the mounds (discovered by John Smock, of Perry County, Ohio, in 1819) one mile northeast of Dresden; and the opening of one mound eight feet high revealed five human skeletons placed like spokes of a wheel with their feet at the centre, and surrounded by flint arrow and spear heads, a stone hammer, an ornamented blue marble pipe, and similar articles of that primitive period. Of one thousand mounds examined in Licking County, Ohio, by Prof. Park, three hundred were found which had not been disturbed by investigation as late as 1870.

It remained for Prof. Frederick Ward Putnam, assisted by Dr. C. L. Metz, to make "the most important archæological explorations ever carried out in North America, being unapproached for scientific method and thoroughness," with results that so interested Prof. Putnam as to decide him in making these investigations a life work. It was in 1881 that

definite plans were so successfully carried out with respect to many of these antiquities as to place accurate accounts of them within reach of all who care to read. The mounds of the Cumberland valley in Tennessee first received Prof. Putnam's attention, but an endeavour among the people of southern Ohio to examine and preserve the earthworks on the Little Miami called him to the scene of their praiseworthy efforts. The first important excavation was that of an ancient cemetery, containing more than sixteen hundred skeletons and covering a plateau of fifteen acres, which according to his calculations must have existed for at least four hundred years. But Prof. Putnam's "most interesting and remarkable excavation" was that of the Turner group, comprising thirteen mounds and two earth circles enclosed by two circular embankments with a connecting graded way between. At the Peabody Museum are preserved two stone altars, four feet square, just as they were taken from the earth, with coal and wood ashes, two bushels of ornaments of stone, copper, shells, bears' teeth, and more than sixty thousand pearls (probably fresh water) perforated for suspension, which mostly had been injured by fire. Prof. Putnam also disinterred ornaments of copper, silver, and gold (this latter the first native gold found in the mounds), which had been hammered out to the required form. But he considered the discovery of meteoric iron and articles made therefrom as the most important "find," though ri-

valled by that of a number of Terra Cotta figurines, somewhat Egyptian in character, and two elaborate animal-shaped dishes carved from red stone.

Most of the earthworks seem to have been fortifications; but near Lebanon, Tennessee, exists a flat-topped mound which probably was the site of a large stone structure of some kind. Near it is a small mound with sixty stone graves containing skeletons and burial objects. The group as a whole seems to represent a fortified village of nearly a hundred houses, guarded by a ditch and an embankment, and possibly by palisades above the latter, while outside the enclosure are a number of mounds which perhaps served as lookout posts, or sentry-boxes. At Newark, Ohio, was found an embankment two miles square, enclosing mounds in the forms of circles, squares, etc., which were supposed to have had some relation to the religious ceremonies of their designers.

The largest of the remains of this ancient race is the great mound of Cakokia, Illinois, opposite St. Louis, and though worn by ploughing, much of its soil being under cultivation, it is still quite traceable. It is about ninety-seven feet high, with "platforms" of some size at lower levels, and was probably a village site. "When we consider that this mound covers an area of nearly twelve acres, and remember that all the earth comprising it was brought a peck at a time in skins or baskets, we can form some idea of the labour expended in its construction."

CHAPTER XII.

MEXICO AND THE FAR WEST.

Section 1. A very quaint and interesting addition to the literature of exploration is the account written by Henry Ker of his Travels in New Spain and Western United States in the years 1808 to 1814. His objects were personal and undefined. A roving disposition, a brave heart, and the desire for increased resources led him from England to America (where he was born), from the old country to the new; and from the known to the unknown he was drawn as by a magnet. On the 10th of August, 1808, this young man left Charleston and journeyed on horseback to Newport, Tennessee, where he took to the water by means of an "ark" (a safe, flat-bottomed boat), and continued his expedition via the Holston, Tennessee, and Ohio rivers to the Mississippi and New Orleans. The Ohio he belauded as "a river universally acknowledged to be the most beautiful of any on the continent or perhaps in the world." After a pleasant visit in New Orleans he returned as far as Natchez, and in October, 1809, started upon a most adventurous trip up the Red River in a small open boat accompanied by a negro servant. Encountering many Indians of both

friendly and hostile tribes, Cadoes, Uames, and Ilisees among them, he was led to exchange his boat for two horses by the delight of the Ilisee chief in the pleasures of sailing, new to Indian experience in that region. On horseback he visited the villages of such Indians as the Parathees, the Quas Migdos, the Yorotees, the Macedens, and the Obodens, and arrived at Talu of the "Mexican Empire" at the end of November. By way of Xilotepec and Chiomporayo, he reached the city of Mexico, where, being observed taking many notes, he was arrested as a spy in the employ of the Spanish; but, his writings being found to be of the most innocent order, merely comprising his observations on the general nature of the country, and affording no governmental information, he was released. On his way north he fell a prey to a band of brigands, who confined him in a cave with designs upon his life, till his freedom was granted through remorse on the part of the robber captain. In 1814 Ker returned to the United States by way of San Antonio, Natchiloches, Tuckapantum, and Gibsonport, to Nashville, where he arrived on the 3rd of July, with an educated discretion and an accumulation of knowledge very large for his years.

Section 2. Adventure claimed many followers when the century was young, but perhaps none more daring than the Patties, father and son, whose long fur hunt in the then new lands of the United States and in old yet unmapped Mexico,—from St. Louis to the Pacific Ocean and southeast to Vera Cruz, in the

period comprised within 1824 and 1830,—gave them full opportunity to prove their mettle. Sylvestre Pattie and his son James left civilization on the 20th of July with the intention of going to the upper Missouri for furs; but not having a licence to trade with the Indians they were turned back at Council Bluffs, and thereupon changed their plans in favour of a New Mexican route. Hearing of an important expedition under a Mr. Pratte, with a destination the same as their own, the Patties decided to join it, and took their way toward the Platte river where the party was encamped. On the Elkhorn river they met a large body of Pawnees, who conducted them to their village (Republican Pawnee) on the Little Platte, and not only treated them courteously but gave them most helpful advice as to methods in the Indian country. The Patties joined their expedition to Pratte's party on the main Platte river, and Sylvestre Pattie, by virtue of his success as a leader when an officer in the United States army, was offered the command of the whole expedition. After a delay employed in collecting a supply of moccasins for the journey, Pattie led his men, 116 in number, with 300 mules and some horses, along the valley of the Platte to the village of the Pawnee Loups, who were friendly farmer Indians and entertained the party with warm hospitality. Corn, beans, pumpkins, and watermelons, were grown by this intelligent tribe, and the success of their efforts went far to prove that the vagabondage of other less

industrious savages was a matter of choice, not of necessity. Soon after leaving this tribe, the long march over wide plains was interrupted to make moccasins of buffalo skin for the horses, whose feet were being cut up by the harsh grass. At Osage Forks the company made camp, killed buffaloes for food, caught the first beaver seen in the journey, and resisted with success an attack from a band of Arricarees, which left one man slightly wounded. This assault from the Indians was so uncalled for that, finding later the bodies of two white men, the command surrounded the red camp and thirty savages were killed in the action which took place. When ten Indian prisoners of war were released with a warning never again to attack unjustly, one of their number presented an eagle's feather to Captain Pattie, saying, "You are a good and brave man. I will never kill another white man."

After this the party pushed onward toward the south and west, till they reached the Taos Mountains. The crossing of this range occupied three days, and brought them to the Spanish town of St. Fernandino, where they found themselves obliged to pay duty on all their merchandise. They commended the Spanish people, rich and poor alike, at this place as elsewhere for their hospitality, which seemed to them as genuine as it was free. Carrying a supply of very palatable piñon nuts to vary the diet, the expedition marched from St. Fernandino to Santa Fé, where a diversity of interests now divided it into two sections. The

Patties, with an escort of five men, left the larger party, with the object of trapping beavers for the skins and incidentally of investigating such parts of the country as their business could include. A journey along the upper Rio Grande del Norte and thence across country brought them to the Gila, a river never before explored by white people. James Pattie with a single companion ascended this river in the winter season, living through almost incredible hardships. On January 1st, they discovered and named the "San Francisco" river. Occasionally big horn sheep were found in the mountains; but the principal food of the Indians of the region was the fruit of the mesquite tree, on which they also fed their horses. The white men found these harsh mesquite beans unpalatable and unsatisfying, but sometimes their only refuge against starvation. On the days when their trapping was successful,—and two hundred beaver skins were collected on the trip,—food was plentiful enough, of course, in the somewhat over luscious form of beaver tails. Descending the Gila, James Pattie wrote, "The country presents the appearance of having been once settled at some remote period of the past. Great quantities of broken pottery are scattered over the ground, and there are distinct traces of ditches and stone walls, some of them as high as a man's breast, with very broad foundations." Though almost starving and greatly distressed for lack of water, the travellers noted the richness of the minerals along their route, specifically mentioning lead,

copper and silver. They were reduced at one time to the bitter necessity of killing and eating a faithful dog, that had followed the fortunes of the expedition all the way from Kentucky. This timely sustenance saved the life of Sylvestre Pattie, who was so reduced by famine as to be hardly able to move. But soon afterward they encountered some deer and turkeys, which for the time relieved their sufferings. Thereupon they returned to Santa Fé for horses with which to convey their furs to safety, only to find that the latter had been discovered and stolen by the Indians and that all their work and endurance had gone for naught.

In April the party reached the copper mines and were hospitably welcomed by the Spanish residents. Here the Patties made a peace treaty with the Comanches for the protection of the mines in the name of the United States, thus making generous return to the Spaniards (whom the Indians hated) for the kindness which the expedition had received at their hands. Under guidance of the Comanches the Patties paid a visit to Salt Mountain, near which they were astonished to find a spring of perfectly fresh water. The minerals of this region included gold, copper, and silver ores, but the latter, though abundant, was so difficult to mine as to be considered unprofitable. Leaving his father with the director of the mines, James Pattie joined some French trappers on another expedition toward Gila river. All but three of this party of thirteen

were killed by the Indians. In his records of this trip, James Pattie wrote of the beauty of the Umene Indians whom he met at the mouth of the Gila. They were as straight as their own arrows, their forms were of the finest proportions, but their heads, alas! were flattened. Pushing up the Colorado river Pattie met tribes of Mohawas, Shuenas, Shoshones Navajos, and Pewees, most of whom were entirely friendly. At the point where the mountains closed in upon the river exploration along its shores became too difficult, and the party forsook the Gila for a route up the other great tributary of the Colorado, the Grand river, which afforded the only way through the Rockies. The passage of the mountains occupied six days and was followed by a trip across the plains to the Platte river. On this trip the party hunted buffaloes with bows made of buffalo ribs, which was like seething the kid in its mother's milk. Leaving the Platte the travellers ventured down the Bighorn to the Yellowstone, up the latter to its head, across the Rocky Mountains, to Clarke's river,—which they commended for its excellent fish,—up Long's Peak, across country toward the head of the Arkansaw river, over the mountains to the head of the Rio Grande, and returned to Santa Fé in August, 1827.

After this the young man's adventurous spirit reasserted itself, and accompanied by one servant he visited many walled towns, inspected what was perhaps the richest mining country in the world, and pushed westward to the Pacific Ocean. At a town called

Tepec he found gold, mined by Tago Indians, selling for ten dollars per ounce. At Paso del Norte he tasted the wonderful native wines, at once rich and delicate. The possibilities of the country appeared limitless. How easily, as either miner or farmer, could he have attained wealth. But his was neither the age nor the temperament for a quiet existence. What life could be interesting that did not depend from day to day upon strength of arm, quickness of eye, and ready wit? Once more he urged his father into the wilderness. Together they joined an expedition to trap for beavers on the Colorado river, and again Sylvestre Pattie was chosen leader. Leaving the Rio Grande del Norte for the Gila, the company fashioned canoes from tree trunks and journeyed down to tide water on the coast of California. Suffering terribly from heat and thirst in the sand desert, which they called "The Sahara of California," they reached the St. Catherine mission, only to be arrested at once as suspicious characters. They were conducted to San Diego, and there, without a hearing, were thrown into prison, where Sylvestre Pattie died. James Pattie, being paroled for one year as recompense for vaccinating the people against a plague of smallpox, was advised to take letters of explanation to the American minister at the City of Mexico. He travelled by ship to San Blas, thence crossed the country to the capital, and left his affairs in the powerful hands of the Mexican president. From Vera Cruz he took passage in a ship for New Orleans, and thence

hastened home to Kentucky. His explorations had occupied six strenuous and eventful years.

Section 3. "A short history of a long journey" was written by John B. Wyeth from his personal experiences during the expedition under the leadership of his relative, Captain Nathaniel Wyeth, during the year 1832. With a company of one and twenty men, and with the hope of making his fortune, the adventurous captain left Boston, on the 1st of March, to explore the Oregon territory. For a private venture the journey across the continent from ocean to ocean was no light undertaking in those ante-railway days. Wyeth invented and built three wagons made of boats on wheels, in which amphibious vehicles he expected to convey his company securely over land and water. They were disposed of on the way! A large supply of "goods" for the Indians, with the necessary arms and ammunition, tents, and camp outfit, completed the equipment of these adventurers, who were characterised by contemporary chroniclers as being of "bold enterprise, neatness, and good contrivance." After crossing the Alleghany Mountains, they passed by steamboat down the Ohio river and thence to St. Louis, which they reached on the 18th of April. Another steamboat journey advanced them up the Missouri to a "town" called Independence,—the last white settlement on the way to Oregon. At this place they joined a band of sixty-two traders from St. Louis, under Captain William

Sublet, who also was bound for the "American Alps."

From Captain Sublet's trapping headquarters on Lewis's river Captain Wyeth moved forward toward the Columbia through a country rich in fur and fish. And here his history, as recorded and published by John B. Wyeth, stops, for the historian of the expedition was one of a party who now turned their faces homeward. The worst of the journey was over, and we know only that the remainder was successfully accomplished by the adventurous captain.

Section 4. An arduous ten thousand miles of exploration and survey was the accomplishment of Captain J. C. Fremont, who conducted three United States government expeditions in the years 1842, '43, and '44. The first, which started from St. Louis, terminated in the Rocky Mountains at "the two points of greatest interest,"—the South Pass, which is the lowest depression, and Fremont's Peak, which claims distinction as the highest point, of the great dividing ridge. The second year's expedition took up the work where the first had dropped it, and worked carefully through the country between the Oregon river and California. And the third venture was an examination of the section of the "Rockies" which gives rise to the Arkansaw, the Colorado of the West, and the Rio Grande del Norte. This expedition also studied the regions of the Great Salt Lake, and a section of the Pacific coast. Captain Fremont's enterprise was planned to carry on

an exhaustive examination of the western territories, already begun by an authoritative survey of the state of Missouri, and it was designed to connect with the limits of survey of the regions about the mouth of the Columbia, under the leadership of Commander Charles Wilkes, U. S. N. Great attention was bestowed upon the map-making, and the results obtained were most accurate and valuable.

Mr. B. M. Norman's quaint account of his venture up the river Paruco in a canoe, in 1844, with a single Indian attendant, is a valuable addition to the bibliography of Mexico. He made a special study of such ruins as he found, and offered many speculations on the strange mounds and idols over which huge fig trees have grown to maturity and decay since their builders left the scene of their unexplained efforts. With infinite labour and caution Mr. Norman managed to secure, and present to the New York Historical Society, a large stone head, and he made and published several drawings of other finds quite as wonderfully preserved.

During the war between the United States and Mexico, a military reconnaissance was conducted by Lieut.-Col. W. H. Emory, covering the country from Fort Leavenworth, Missouri, to San Diego, California, and including the Arkansaw, Rio Grande del Norte, and Gila rivers.

Colonel Emory, though on military duty, made the most of his opportunity to study the regions through which he passed, and was efficiently aided by Lieu-

tenants Peck and Abert. They observed that this region fell into three great divisions, distinct in character, climate, and resources. The first, from Fort Leavenworth to Pawnee Fork, was a high, rolling, prairie land, with occasional rock formations of fossiliferous limestone and coal, frequent woods of oak, black walnut, willow, sycamore, elm, hickory, sumach, and cottonwood. This division was occupied by roving tribes of Pawnees, Sioux, Osages, and some Comanches. The second, from Pawnee Fork to Bent's Fort, via the Arkansaw river, was partly sand hills and partly prairies of good nutritious grass, with no trees, some sandstone, and cacti in endless variety, including the wonderful *Ipomea leptophylla,* which the Indians called man-root from its size and shape. The third, from Bent's Fort to Santa Fé, was mostly grass lands; with a belt of cottonwood, called the Big Timber, about three-quarters of a mile wide and three or four miles long, where the Indians were wont to gather their winter fuel, and feed their horses on the young cottonwood. It was in this third section that the party first saw the *Yucca augustifolia,* the palmido or soap plant, and the mesquite grass, on which their horses pastured. There were game animals such as buffalo, deer, elk, and antelope, along with their ever present attendants, the wolves; while birds and insects, on the other hand, were very rare. There, too, they got the first news of gold, silver, and copper. At the Rio Grande del Norte, Colonel Emory knelt to slake his

thirst, and as he raised its water to his lips his toast was "the gallant Pike!"—a deserved tribute to his indefatigable predecessor.

In haste to proceed, Emory detailed the young officers Peck and Abert to make a map of New Mexico, and himself turned toward the West and California along the Salt and Gila rivers. He found mines of copper, sulphuret, silver and gold, in the valley of Nimbres, where a man named McKnight, "one of the earliest adventurers in New Mexico," was said to have amassed an immense fortune. At Pecor, an ancient fortified town, he saw the place where once had burned the eternal fires of Montezuma, till the Aztecs, dwindling and retiring before their foes, removed them still alight to an unknown place "over the mountains." Still more mysterious were certain strange ruins that marked the sites of former habitations, and which commemorate the mechanical knowledge and engineering skill of a race which the oldest tradition does not tell of. After fording the Colorado river, Emory and his company came to sand buttes, where they had to dig for water, and then to the great desert, stretching "ninety miles from water to water!" From the brow of a hill they first saw the Pacific Ocean, and an inlander exclaimed, "Lord! There is a great prairie without a tree!" Colonel Emory's work as a topographical engineer ended at San Diego, and his more strictly military duties occupied the rest of his journey to San Francisco.

PART FIVE.

EXPLORATION IN CENTRAL AND SOUTH AMERICA.

CHAPTER XIII.

CENTRAL AND SOUTH AMERICA.

Section 1. Since Vasco Nuñez de Balboa first crossed Central America, this neck of land which has been said to possess from its austere plateaus to its sweltering alluvial something of all climates in epitome, has served as a background for vivid pictures in the struggle for gold and empire. Mailed conquistadores, swarthy buccaneers, and bearded adventurers from many nations have contributed to its atmosphere of colour and romance. But their stories are of another age. Grijalva, Cortez and Guray, the best known of its pioneer explorers, belong to the early 16th century. The geographical work that remained to be done in recent times consisted, comparatively speaking, of the filling in of details.

The country is described in general terms as an endless succession of "mountain valleys clothed with dense vegetation, and nowhere allowing of great plains, though naturally presenting so immense a

variety of climate that in the course of a day's journey the traveller may pass through hot, temperate, and cold regions." It is a land scarred with ancient earthquakes; and still sentinelled along its western coast with muttering volcanoes. Its forest growths are so rankly luxuriant, its rivers for the most part so little adapted to navigation, and the whole country so inadequately supplied with good roads, that the work of instrumental survey is not easy. In Nicaragua the gigantic and slow-growing mahogany trees are said to deflect the compass sometimes as much as three degrees. Here, in these "dark and ghostly forests of the sun-land," the explorer welcomes to his pot the great iguana lizard, whose delicate flavour belies its unappetizing personal appearance.

Section 2. For a long time the jealousy of the Spaniards was a serious barrier to scientific research in Central and South America. In Central America the more conspicuous explorations during the 19th century have been mainly inspired by one or other of two motives. Eager students of archæology and ethnology have pierced the fastnesses of its tangled forests, seeking those ruined cities of the dead which have caused Central America to be regarded as "the cradle of civilization in the New World;" and expeditions from various governments have traversed the isthmus in search of the best route for a canal to join the Atlantic and the Pacific.

Of that mysterious race cradled in the table-lands

of Honduras and Guatemala, which had made wide roads and builded noble cities hundreds of years before the keels of Columbus turned westward into the unknown, we know comparatively little. The growth of their civilization, and the story of their exploration and possession of the land in which the Spaniards found them, are lost in the tantalizing regions of unrecorded history. Their architectural remains, of which more than half a hundred groups have been discovered, lie buried in the jungle, throughout a limited area of the tropics, none existing north of the 22nd parallel, and none south of the 12th parallel of north latitude. Of the curious civilization which produced them, only these monuments remain. They bear witness to a people advanced in agriculture and the art of government, a people possessing a priesthood and an elaborate ritual, whose development was cut short at a most interesting stage by the advent of the Spaniards. Their descendants of to-day are a disinherited race, almost without traditions of a past. Among the more famous ruins are those of Palenque—politically under Mexican dominion, but geographically in the natural division of Central America—Utatlan and Copan. All are at a considerable elevation and nearer the Pacific than the Atlantic seaboard.

In the low and teeming lands of the Eastern coast, there exist neither monuments nor traditions to indicate that the Indians of those regions have ever known any state more advanced than their savagery.

The ruins of Palenque were explored by Captain William Dupaix in three successive expeditions between 1805 and 1807. In 1822 Antonio del Rio visited them, and ten years later Frederick Waldeck made important researches. The published works of these men added to our knowledge not only of a strange and vanished civilization, but of the natural history of Central America.

The most imposing structures in these ancient cities were evidently temples. They are described as "raised high above the surrounding buildings, on grand basements, square on plan, and rising by high steps to the summit, so as to have the general outline of a low truncated pyramid." Mr. Catherwood considers these remains to be the productions of "a peculiar and indigenous civilization," and claims that "they present but very slight and accidental analogies with the works of any people or country in the old world."

Section 3. The great project of a canal to cut the isthmus led to the surveying or partial exploration of some dozen courses before the Panama route was adopted, in 1881, and work on it begun. In 1854 and following years French and English expeditions examined the country in connection with this scheme, and in 1870 the United States Government carried out important surveys.

Yet the region of the *Lacandones,* wild Indians who roam over the unexplored Cordilleras, shunning all intercourse with the whites, can still be classed as

practically unknown. Waldeck describes the costumes of some of these Indians seen by him as resembling that of the figures on the bas-reliefs of Palenque and Ocosingo. Their places of worship they hide away in the forests, remote even from their own villages.

Section 4. Sir Clements Markham speaks of South America as "the classic land of travellers," and of its explorers he says that "every geographical author should be a student of Humboldt, of Schomburgk, and of Bates." It is doubtful if any country offers its mysteries in a more alluring guise. The illimitable forests of the Amazon, the vast alluvial deposits of the Argentine Pampas, the desolate shingle deserts of Patagonia, and the stupendous cordillera of the Andes, have each their peculiar appeal to the imagination and each their peculiar problems for the scientist.

Section 5. When Alexander von Humboldt, about one hundred years ago, landed on its northern coast, South America, thanks to the jealous policy of Spain, was an almost untouched treasure-house for the scientist. Earlier writers had surrounded it with a glamour of strange myths, peopling its forests, the noblest in the world, with republics of warlike women, with Indians whose heads grew out beneath their shoulders, and with solitary and hairy "old men of the woods" whose pleasure it was to carry away women from the villages. Nor were giants lacking in this wide realm of the marvellous, but

loomed to any height the imagination desired through the air of the vast Patagonian plains. While like a flash of splendour against these sombre monstrosities stood out the legend of El Dorado.

The beginning of the 19th century found the great Prussian naturalist at work in this land of rich promise. In 1800 Humboldt, with the botanist Bonpland, explored nearly the whole course of the Orinoco, a river surpassed in volume among South American streams by only the Amazon and the Parana. This expedition succeeded in proving that the Cassiquiare, an arm of the Orinoco, joins the Rio Negro, which in its turn empties into the Amazon, thus settling the long-disputed question of a water-communication between these two vast river systems. Humboldt reached the Rio Negro in the first place by a portage to the Pimichin and the descent of that stream, but his return journey to the Orinoco was entirely by water, by way of the Cassiquiare.

The explorers were unable to extend their journey by way of the Rio Negro and Amazon to the Atlantic, owing to the state of South American politics, which raised a barrier to the passage from Spanish into Portuguese territory. They were compelled to leave unaccomplished also the discovery of the sources of the Orinoco, because of the hostility of the Indians along its upper waters.

In Humboldt's time the more amenable families of the Orinoco Indians were gathered together in semi-christianized villages or missions, scattered at

wide intervals along the river as far as its junction with the Cassiquiare. Yet even among these the priests complained of occasional lapses into cannibalism and other undesirable customs which flourished among their relatives beyond these little spheres of influence. Both polygamy and polyandry obtained among these outlying tribes. Their chief weapon was the poisoned arrow. Even in individual missions Humboldt found the number of different native languages in use both astonishing and confusing.

Among the most interesting of the tribes described by Humboldt as found on the Orinoco may be mentioned the Otomacs, who during two months of the year when the river is in flood and fish are difficult to capture, eat daily large quantities of a fine unctuous clay; a tribe of the Cassiquiare which during a great part of the year subsist upon a paste made of a species of large ants; the fair-skinned and the dwarf Indians of the Upper Orinoco, of which early writers had given exaggerated accounts; and the Guaraons, tree-inhabiting Indians of the Orinoco delta, who live in the moriche-palm, the "tree of life" of the missionaries. Of these Guaraons Humboldt says: "It is curious to observe in the lowest degree of human civilization the existence of a whole tribe depending on one single species of palm-tree, similar to those insects which feed on one species of plant."

In 1801 Humboldt ascended the Magdalena river,

journeyed overland among the frozen ridges of the Andes, and reached Quito in January, 1802. From here he explored the masses of Pichincha and Chimborazo, and made an expedition to the sources of the Amazon. His work in this volcanic region led to some of his most important and brilliant generalizations. After carrying his investigations into Mexico, he returned to Europe in 1804.

Section 6. The struggle of the Spanish colonies in equinoctial America to throw off the yoke of Spain served for a time to check the impulse given to scientific exploration by the work of Humboldt. But as soon as the turbulent politics of the country permitted, naturalists hastened to explore its treasures. During the years 1817-20, "by command of his Majesty the King of Bavaria," a scientific expedition under Doctors Spix and Martius explored the eastern coast and the valley of the Amazon. For some time this expedition made Rio de Janeiro its base. In 1819 they sailed to Para, and thence began the ascent of the Amazon. The solitude of the great forest was relieved by wandering tribes of savages, and by the noise of countless multitudes of monkeys and birds. The stream swarmed with turtles and crocodiles. Five hundred miles from the mouth of the river they found the rise and fall of the tide still perceptible. Beyond the mouth of the Rio Negro "everything becomes more wild, and the river of the Amazons resumes its ancient name of Solimoës, which it had from a nation now extinct."

At Ega the travellers separated, Dr. Martius following the course of the Japura, while Dr. Spix, continuing his journey up the main stream, "crossed the broad rivers Jurua and Jurahy, and the Spanish river Içа, and penetrated at length, through clouds of poisoned arrows discharged by the Indians, and of venomous insects, through contagious diseases and threatening mountain torrents, to the mouth of the river Jupary, at the last Portuguese settlement of Tabatiaga, on the frontiers of Peru, where he heard the language of the Incas." His colleague on the Japura "overcame by the most painful exertions the cataracts and the rocks of the river, and at length arrived at the foot of the mountain Arascoara, in the middle of the southern continent, separated from Quito only by the Cordilleras." Thus quaintly are their voyages summarized in an English translation of their travels published in 1824.

Returning to Para in 1820 the two scientists prosecuted from that centre a number of lateral expeditions which added to their collections and extended the scope of their observations. To quote again from the summary above referred to, "the continent had been traversed from 24° south latitude to the Equator, and under the line from Para to the eastern frontier of Peru; an incredible store of natural treasures and of curious information had been acquired."

On his return to Europe Dr. Martius published, at the expense of the Austrian and Bavarian gov-

ernments, a most important work on the flora of the regions visited by his expedition.

Section 7. Mr. J. B. Pentland took advantage of his long residence in South America as a British consul (1825 to 1837) to carry on an important series of explorations in Peru, Chili and Bolivia. An accomplished geologist and trained observer, his geographical work gained the praise of Humboldt, Cuvier and Peschel. The region covered by his researches was then little known, and the existing maps of it were not only lacking in detail, but inaccurate and misleading. He measured some of the chief summits of the Bolivian Andes, among them Illimani and Sorata; and his determinations of certain points by astronomical observations were of great value to geographers. He was the first to call attention to the remarkable fact that certain streams formerly mapped as having their sources on the eastern side of the Andes actually rise to the west of the Cordillera Real, and find their way eastward through gorges in that seemingly impassable barrier. But perhaps the most interesting region he visited was that of Lake Titicaca.

For a broad statement of the location and setting of this remarkable body of water we cannot do better than quote Pentland's own words: "The great chain of Andes, which appears to form an undivided ridge from the most southern extremity of the American continent to the neighbourhood of the tropic of Capricorn, separates into two great longitudinal

ridges in the vicinity of the celebrated city of Potosi (lat. 19° 35′). These ridges . . . . bound the immense inter-alpine valley of Desaguadero, including the great mediterranean lake of Titicaca, ... and re-unite at the northern extremity of this great basin to form again an undivided chain in the Andes of Vilcañota and Cusco." This vast elevated basin, or enclosed plateau, has no visible outlet for its water-system.

Pentland estimated the area of Lake Titicaca, the largest body of fresh water in South America, as over four thousand square miles, and its elevation he found to be 12,795 feet above the sea, "an elevation superior to that of the highest summits of the Pyrenees." To the great terrestrial basin already defined, in the northern and highest part of which the lake lies, he ascribes an approximate area of more than 16,000 square miles, a figure which has been doubled by later authorities. There are indications that in a remote age the lake occupied the greater part of this tremendous basin, and poured its overflow eastward through a profound gorge which still cuts the Cordillera Real near La Paz. It must then have been the largest lake in the world; and if its glory did not end with the disappearance of the ancient Pampean sea, it must at one time have formed the chief reservoir of the Amazon, the largest river in the world.

Now the only visible outlet of Titicaca is the Desaguadero, a stream scarcely fifty yards in width which

escapes southward only to lose itself again in the little-known expanse of Lake Aullagas. Pentland called attention to the fact that the rarefied atmosphere due to the great height at which Lake Titicaca lies must cause enormous evaporation, thus solving the mystery of its surplus water. Later writers, however, have found this solution inadequate, and incline to the theory of a subterranean outlet.

Though ice forms along the shores of Titicaca, the lake never freezes over, and its presence moderates the climate of the lofty and desolate region in which it lies. The most famous of its islands, also called Titicaca, was the sacred island of Peru, to which the Incas traced their miraculous origin. It still shows a ruined temple of the Sun and a royal palace, with other monuments of a lost civilization. On a neighbouring island are the remarkable remains of the Palace of the Virgins of the Sun. Some at least of the Indians who still inhabit this region are undoubtedly descendants of that great race of empire builders which went down before the march of Spanish conquest.

Pentland's explorations of Lake Titicaca were carried on during 1827–28, and again in 1837. Having surveyed and mapped it, his observations were embodied in a chart published by the British Admiralty.

Contemporary with the researches of Pentland were those of Eduard Poeppig, a German naturalist who spent the years 1827–32 in Chili, Peru, and the

basin of the Amazon. In 1830 he made the descent of the Huallaga, a stream which flows into the Marañon or upper Amazon after a course lying between and nearly parallel to the courses of that river and of the Ucayali.

Section 8. In November, 1827, Lieut. Henry Lister Maw, R. N., accompanied by a Mr. Hinde, began an adventurous journey across South America from the Pacific to the Atlantic. Sailing from Lima to Truxillo, he thence crossed the Peruvian Andes, part of the way on foot, to Balsa Puerto on the Cachiyaco river. This stream he descended by canoe to its junction with the Huallaga, which in turn carried him to the Marañon. Deserted by his Indians, he drifted on to the Brazilian village of Egas (now Teffe), where he was able to procure a fresh crew. At Barra, at the mouth of the Rio Negro, he embarked on a river craft which traded down the Amazon. At Santarem the stupidity of certain Brazilian officials led to his arrest and trial on an absurd charge of being a menace to the peace and safety of the country. In April, 1828, Lieut. Maw emerged safely from his long adventure into the brilliance and social gaiety of Para.

On the remoter reaches of the Amazon in Brazil Maw found the "brancos," of low European stock, still hunting and enslaving the wild Indians; while among the latter he heard of those whose custom was to eat their aged relatives, considering such interment preferable to that offered by the grave. His

impressions of the branco throw some light upon Dr. Martius' lament for the Amazonian Indian quoted in *section* 6 of this chapter. Maw writes: "Continuing our route, we reached marks of—not European civilization—but European demoralization. The uneducated, unenlightened branco, finding himself unchecked by those laws and authorities that existed in the country he has left—finding himself amongst a people inferior to his countrymen, and not comprehending the advantage or necessity of restraining his inclinations, assumes arbitrary power, and commits uncontrolled enormities; whilst the unfortunate wretches amongst whom he fixes suffer his tyranny and acquire his vices. It is perhaps not possible to behold human nature more degraded. Slowly and with difficulty we passed through this state of things, until we again met with a general commerce, which, in such cases, may be said to bring healing on its wings, by importing true civilization, and proving the necessity of just laws and well-regulated authority."

Section 9. Of more geographical importance than Maw's journey was the crossing of the continent by Lieut. Wm. Smyth and Mr. Frederic Lowe, R. N., during the years 1834–35. This expedition indicated, although prevented from entirely following, the great water-route from Peru to the Atlantic by way of the rivers Pachitea, Ucayali and Amazon.

Leaving Lima in September, 1834, the travellers crossed the Andes, through hail and snow, traversed

a silver-mining region of Peru, and made the utmost efforts to reach, by a long-abandoned trail, the deserted fort of Mayro on the head-waters of the Pachitea. But dread of the terrible Cashibos, a cannibal tribe living among the forest fastnesses of that river, caused the repeated desertion of the Indians and the Peruvian soldiers that accompanied the expedition, so that finally the attempt to reach Mayro by land was relinquished.

Smyth and his companions then descended the Huallaga to the mouth of the Chipurana, ascended that stream and the Yanayacu as far as canoes could go, portaged across to a little river called the Santa Catalina, and descended the latter to its junction with the Ucayali, whose waters had never before been navigated by an Englishman. They still hoped here, through the influence of a priest whose life had been spent among the Indians, to procure canoes and boatmen for the exploration of the Pachitea. They learned, however, that to ascend that river would require a little army of conquest at least three hundred strong, a force beyond the means of the expedition. With extreme disappointment they at length continued their voyage down the Ucayali to the Marañon, and thence to Para.

The Indians of the Huallaga were expert canoemen, and Lieut. Smyth was much impressed by their manner of "running" the fiercer rapids to an accompaniment of their own barbaric music. He writes: "The waves completely concealed the body

of the canoe, leaving the men only visible through the spray; and as they approached us, the wild Indian scream, the constant drumming, the hollow sound of the horn, the roar of the water, and the savage grandeur of the surrounding scenery, raised in us feelings of admiration and delight which must always remain fresh in our memories." Yet these Indians did not furnish ideal crews for an exploring expedition, refusing to make any journey unaccompanied by their entire families of women, children, dogs and cats.

On this journey Smyth determined his route by careful observations as far as the mouth of the Rio Negro, beyond which point the course of the Amazon was already pretty accurately laid down. He found much error in the best maps of the upper course of that river. He notes the curious fact that with the exception of sudden and brief squalls, the wind on the Amazon "was always in a direction exactly contrary to that of the stream, notwithstanding its windings; and the same was the case on the Ucayali and the Huallaga."

CHAPTER XIV.

SOUTH AMERICA.

Section 1. In 1826 the ships "Adventure" and "Beagle" were commissioned by the British Admiralty to survey the southern coasts of South America. The expedition was commanded by Philip Parker King and Robert Fitzroy, R. N.

The eastern coast of Patagonia had already been charted by Malaspina, and the Strait of Magellan mapped with a good deal of detail by Narborough, Cordova, and others; but the southern coast of Terra del Fuego had been little explored, and the difficult western coast of the continent as far north as the island of Chilóe was to a great extent unknown.

During 1826–30 a laborious and exact survey, with but few breaks from the La Plata to the Horn and northward to Chilóe, was accomplished. Communicating with Magellan Strait Fitzroy discovered two large unknown inland seas, which he named Otway Water and Skyring Water. On the shores of the Strait King was struck by the presence of parrots and humming-birds, both chiefly associated in our minds with tropical surroundings. The humming-

birds he noticed in the month of May darting about through an atmosphere white with falling snow.

The surveying of the western coast was a matter of considerable danger owing to the fierce tide-races which rage through its intricate channels. From about 40° S. to the southern extremity of the continent the Pacific washes the very base of the great chain of the Andes, and "flowing as it were into the deep ravines that wind through its ramifications, forms numerous channels, sounds and gulfs, and in many instances, insulates large portions of land." Some of these sounds terminate in magnificent glaciers, and the whole coast is fringed with large islands and archipelagoes.

Upon its return to England in 1830, the expedition carried with it four Fuegian Indians, of the lowest race of South American aborigines.

From 1831 to 1836 this surveying voyage was continued by the "Beagle" alone, commanded by Robert Fitzroy and with Charles Darwin on board as naturalist. This second expedition filled in the gaps left in the work of the first, carried the survey of the Pacific coast as far north as Guayaquil, explored a part of the unknown interior of Patagonia by way of the Santa Cruz river, and surveyed the remarkable group of the Galapagos Islands.

Fitzroy relates that off the coast of Patagonia the "Beagle" was enveloped in a wonderful cloud of white butterflies swept to sea before the wind, "as numerous as flakes of snow in the thickest shower."

He estimated the space occupied by this frail host to be "not less than two hundred yards in height, one mile in width, and several miles in length."

It was in April, 1834, that the "Beagle" sent a party in boats to explore the unknown course of the Santa Cruz, a rapid stream, which, fed by the snow-fields and glacial lakes of the Andes, crosses southern Patagonia below the 50th parallel of latitude, and empties into the Atlantic. Though tried by the freezing nights and blazing days, they found the climate dry, clear and invigorating. No headway could be made against the current except by towing, a process unpleasant enough along bleak shores bordered only by a species of thorny shrub. The surrounding country was a vast expanse of gravel plain, treeless and unbroken. Land and water seemed alike barren, and not a fish was taken during the journey. The monotony was only broken for the eye by wary herds of guanacoes, wandering in search of the scattered tufts of wire-grass, and now and then a huge solitary condor soaring against the sky, or a few ostriches striding along the horizon.

The eighth day brought them to a region even more forbidding, where sombre basalt overlaid the shingle, giving to the country a surface like rough iron. Here was a curious record from the days of the Pampean sea, when all this land lay beneath the Atlantic. Darwin says: "The basalt is clearly nothing more than lava, which has flowed beneath the sea; but the eruptions must have been on the grandest scale. At the

point where we first met this formation the mass was about 120 feet in thickness; following the river course it imperceptibly rose and became thicker, so that at forty miles above the first station it was 320 feet thick. We must therefore look to the mountains of the Andes for its source; and worthy of such a source are streams which have flowed over the bed of an ocean to a distance of one hundred miles."

In twenty days, the party had explored about 250 miles of the Santa Cruz, and was then within sight of the Andes, when lack of food compelled its return.

Considerable interest attaches to the explorations of the "Beagle" expedition in Terra del Fuego, that outcast among lands a bit of whose forest scenery Darwin describes as follows:—"On every side were lying irregular masses of rock and uptorn trees; other trees, though still erect, were decayed to the heart, and ready to fall. The entangled mass of the thriving and the fallen reminded me of the forests within the tropics;—yet there was a difference; for in these still solitudes, Death, instead of Life, seemed the predominant spirit." Elsewhere in his journal, writing reminiscently of this voyage, Darwin speaks of the impression made upon his mind by "the stars of the southern hemisphere,—the water-spout—the glacier leading its blue stream of ice in a bold precipice overhanging the sea—an active volcano—and the overwhelming effects of a violent earthquake." But of all these scenes, he adds, "none exceed in sublimity the primeval forests undefaced by the hand of

man, whether those of Brazil, where the powers of Life are predominant, or those of Terra del Fuego, where Death and Decay prevail."

The last work of the expedition in South American waters was the survey of the Galapagos Islands, a volcanic group lying under the equator, five or six hundred miles west of the mainland. Darwin says: "The natural history of this archipelago is very remarkable: it seems to be a little world within itself; the greater number of its inhabitants, both vegetable and animal, being found nowhere else." Most conspicuous among its fauna were great numbers of a gigantic kind of tortoise, and two strange species of large lizard. But more significant yet was the fact that individual islands of the group possessed species peculiar to themselves; and this even among the birds. The latter showed no fear of man. A full-grown hawk allowed Darwin to push it off a branch with the muzzle of his shot-gun.

This voyage of the "Beagle" will be always memorable as having led Darwin to that series of researches which resulted in his writing "The Origin of Species," a book which has made its influence felt in almost every department of human thought.

Section 2. In the same year when the British survey of those coasts was begun, Alcide Dessalines D'Orbigny, a French zoologist and ethnologist, was commissioned by the Museum of Natural History at Paris to travel in South America. For eight years (1826-33) he wandered through the country, jour-

neying southward from southern Brazil through Uruguay, the Argentine Republic, and Patagonia; thence northward through Chili, Bolivia and Peru. Having been hospitably received by a band of Patagonian Indians, D'Orbigny was compelled to fight side by side with his hosts in a savage war against a neighbouring tribe.

Jules Verne states that "it took 13 years of hardest work to put together the results of D'Orbigny's extensive researches." He made collections of great value to science, and his encyclopædic writings resulting from this expedition were published by the French Government in twenty-one quarto volumes.

Section 3. Robert Hermann Schomburgk, a Prussian scientific traveller, spent eight years (1835-44) exploring British Guiana and neighbouring regions to the north of the Amazon. His important work was carried out in the beginning under the auspices of the Royal Geographical Society of London, and later by commission of the British Government.

Humboldt, it will be remembered, had been prevented from extending his explorations on the upper Orinoco beyond the little Indian Mission of Esmeralda. But he had called attention to the fact that east and south from that village there stretched practically unknown country three times as large as Spain, in which not a single position had been astronomically determined. This, except where it lay to the east of the 55th meridian, was the region explored by Schomburgk.

Late in 1835 he began his explorations by the ascent of the Essequibo and its tributary the Ripanuny. The latter stream he ascended as far as it was navigable by his lightest corial, beyond which point he pushed on on foot across low savannahs toward its source, until forced by illness and the rainy season to turn back. After visiting Lake Amuku he continued the ascent of the Essequibo to its great falls, which he named King William's Cataract.

On this first expedition the explorer was deeply impressed by the beauty and strangeness of his tropical surroundings. Inquisitive bands of monkeys frequently followed the corials along the banks, and at one point a large jaguar regarded the expedition with tolerant indifference, moving calmly into the forest only when the boats were within sixteen yards of him. Schomburgk describes a night on the upper Essequibo, at the beginning of the rainy season, when the fallen and decaying leaves were phosphorescent, illuminating the ground about his tent:—"But this was not the only wonderful production of the rain; the latter had loosened the tongues of all the frog-kind in the vicinity, and to judge from the variety of their cries, the species were numerous. The sounds resembled the bleating of calves, the chirping of birds, the call of the duck, and even the hoarse voice of a man; but the most remarkable was 'the paddler,' whose quacking voice resembled the regular stroke of a paddle."

Schomburgk next (1836) explored the Corentyne

until his corials were stopped at the foot of a splendid composite cataract, which in one of its channels had an unbroken leap of forty feet. Where previous maps had represented this river as taking its rise he found it still an important stream with a width of nine hundred yards.

In November of the same year he began the ascent of the Berbice. Where this river plunges in a long series of rapids it swarmed with large caymans, while boas and iguanas were numerous in its thickets. The innumerable rapids were further obstructed by the trunks of huge fallen trees, and the difficulties increased with every mile. The first of January, 1837, found Schomburgk almost discouraged. But entering on that day a smoother and expanded reach of the river, all troubles were blotted out in the enthusiasm of discovery. In his own words:—"Some object on the southern point of the basin attracted my attention; I could not form any idea what it might be, and I hurried the crew to increase the rate of their paddling; in a short time we were opposite the object of our curiosity— a vegetable wonder! All calamities were forgotten; I felt as a botanist, and felt myself rewarded. A gigantic leaf, from five to six feet in diameter, salver-shaped, with a broad rim of a light green above and a vivid crimson below, rested on the water; quite in character with the wonderful leaf was the luxuriant flower consisting of many hundred petals, passing in alternate tints from pure white to rose and pink." Thus

was discovered the now famous *Victoria Regia,* perhaps the most striking and beautiful representative of the flora of the western hemisphere.

Failing food, exhaustion, desertions among his Indians, and difficulties of navigation so great that with the utmost exertion his progress was often scarcely two miles per day, compelled Schomburgk to give up all idea of reaching the sources of the Berbice. Before beginning the descent, however, he corrected the position ascribed on the maps to the upper course of this river, by a journey overland to the Essequibo, only nine miles distant.

September of the same year found him started upon another expedition to discover the sources of the Essequibo. The route chosen took him largely through unknown country, among Indians who had never before seen a white man. By the end of the year he reached one of the sources of the river, among mountains more densely wooded than any he had before seen. Returning to the Ripanuny, he occupied some months in side explorations. Later he reached Fort San Joaquin on the Rio Branco, a tributary of the Rio Negro, whence he explored the Carumá Mountains.

In September, 1838, he returned to Lake Amuku, whence a journey on foot brought him to the sheer red walls of the Roraima Mountains. This remarkable upheaval of the older sandstones is celebrated by the Indians in their songs as "Roraima of the red rocks, wrapped in clouds, the ever fertile mother of

streams." Here, from enormous cliffs which tower to a height of 1500 feet, waters hurl themselves in marvellous cataracts, and flow in different directions to join the Amazon, the Orinoco, and the Essequibo.

From Roraima a journey of three months, through regions for the most part known only to the Indians, brought this indefatigable explorer to Esmeralda (Feb. 1839), thus connecting his astronomical observations from the east with those of Humboldt from the west. He had hoped at the same time to reach the sources of the Orinoco, but when in sight of the very mountains among which they lie was turned back by the murderous attitude of the Kirishanas, who had previously frustrated Humboldt's attempt. However, Schomburgk's journey reduced all uncertainty as to the source of that river "to within the narrow limits of less than thirty miles."

From Esmeralda, following Humboldt's route by the Cassiquiare to the Rio Negro, he returned by the Rio Branco to Fort San Joaquin. Thence striking overland to the Essequibo, he reached the coast again, having been absent from civilization for nearly two years. During this time he had made a circuit of upwards of 3000 miles.

In 1841 he explored the wonderful delta of the Orinoco, and "acquired a correct knowledge of the courses of the rivers Waini, Barima, Amacura, Barama, and Cuyuni, all of which had never before been visited by any person competent to delineate them in

a map." Most of these rivers of the flat coast region communicate with one another by curious connecting channels. The marshy vegetation of this rich alluvial belt gives the country a border of vivid green, relieved by numerous flocks of scarlet ibises, white aigrettes, and flamingoes.

The following year found Schomburgk at the sources of the Takutu, a stream which joins the Rio Branco after a course of about two hundred miles.

In 1843, starting from Pirara, a Carib village near lake Amuku, he reached Watu Ticaba, a village of the Wapisianas on the upper Ripanuny. An overland journey brought him to a settlement of the Maopityans, whence by the descent of the Caphiwuin and the ascent of the Wanamu, two small and turbulent rivers of the interior, he reached the country of the Pianoghotto tribe, at the sources of the Corentyne (1844). By the latter river he returned to the coast.

Throughout his journeys in Guiana everywhere among the Caribs Schomburgk met with stories of a horde of warlike women, called Woruisamocos, who were said to dwell near the sources of the Corentyne, in a region no European had ever visited. The accounts given were so circumstantial and definite that the thing assumed some probability. All his informants agreed that these Woruisamocos " shot with the bow and arrow, and used the *cura* or blow-pipe; that they cultivated their own grounds, and held no intercourse with other Indians except once a year,

when they permitted men to visit them in parties of twenty; and that if their offspring proved a male they killed it, but reared the female children." His last expedition, however, took him through the very *terra incognita* ascribed to these independent females, and resulted in driving the ancient and persistent myth of the Amazons from one of its last refuges.

The level maritime region of Guiana stretches back from ten to forty miles, to a ridge of sandstone which must have formed a prehistoric coast-line. Beyond a second ridge of hills extends a gradually rising table-land. Here the rivers become practically unnavigable, and present scenes of splendid confusion. Their tumultuous descents are often interrupted by huge granitic boulders as much as forty feet high. Schomburgk frequently found the largest of these rock-masses engraved with rude picture-writings, of which the meaning is lost. He traced these strange inscriptions scattered here and there over an extent of 350,000 square miles. His Indians seemed to regard them with a certain amount of awe, although the only explanation they could give of their origin was that "women made them, long ago."

Schomburgk constructed an admirable map of the region he explored, and his collections were a valuable acquisition to the British Museum. For his important services to geography he received the gold medal of the Royal Geographical Society, and was knighted by the Queen.

Section 4. An important French Government

expedition, under the leadership of Count François de Castelnau, was occupied from 1843 to 1847 in explorations within the vast extent of South America lying between the tropic of Capricorn and the Equator. This expedition twice crossed the continent, first from Rio de Janeiro to Lima, and thence eastward again by the Amazon to Para.

This immense journey revealed all the most varied and characteristic phases of the scenery of tropical South America. After crossing the virgin forest zone of the Atlantic border, the explorers entered upon the great campo section of the interior, whose sparse and stunted trees contrasted strongly with the region left behind. From Goyaz in Brazil they descended the Araguay, then almost unknown, and returned southwards up the Tocantins, whence they traversed a great wilderness inhabited only by fierce cannibal tribes. A laborious march of two months carried them across the wide solitude which separated them from Cuyaba. Thence by an excursion northward they determined the sources of the river Paraguay, entangled, it may almost be said, with those of the Rio Tapajos, of the Amazonian system. Returning to Cuyaba, they descended the rivers Cuyaba, San Lourenço and Paraguay to Fort Bourbon. Reascending the Paraguay, they traversed, after an excursion into the Gran Chaco, the great Laguna de los Xarayes, hitherto unexplored. The remainder of their journey westward took the travellers through Potosi, the highest abode of man in South America, and past Lake Titicaca, to Lima.

Special interest attaches to the Gran Chaco and the "Laguna" de los Xarayes. The latter is not in reality either a lake or a marsh, but a great level plain, part of the bed of the old Pampean Sea. During the rainy season, however, the streams flowing through it are merged into one vast sheet of water, stretching in all directions beyond the sky-line, with here and there clumps of trees dotting its surface. Being in this state of inundation when first discovered by the Spaniards, they thought it a boundless lake, the source of the Paraguay. Somewhere beyond its unexplored horizons their imaginations placed the site of El Dorado—a fable, apparently, of many habitations. It is curious to note that Keymis locates it on an island of the non-existent "White Sea" in Guiana, a geographical myth born also of the rainy season, when Lake Amuku overflows its wide savannahs.

Proceeding to Cuzco, Castelnau thence began his second journey across the continent (1846). With a party of about thirty, including a military escort, he reached the village of Echaraté in the valley of Santa Ana, where he superintended the building of canoes and rafts for the voyage. Finally his little flotilla began the descent of the Urubamba. Dissension, desertions, and the difficulties of navigation soon reduced the party to such weakness that Viscount D'Osery was sent back with a large part of the impedimenta, instruments and collections.

After the first 180 miles the difficulties of de-

scending the Urubamba diminished, and Castelnau reached in safety the confluence of that river and the Tambo, which united form the Ucayali. The latter has substantial claims to be considered the real mother-stream of the Amazon, its course being longer and its volume greater than the Marañon. According to Castelnau, navigation is possible from the mouth of the Ucayali to the lowest considerable cascade of the Urubamba, a distance of 1040 miles. This would give, from the mouth of the Amazon to the cascade in question, 3360 miles of uninterrupted river navigation.

Castelnau reached Para without serious misadventure; but in the meantime the expedition had suffered a grievous loss in the murder of the young savant, Viscount D'Osery, who had been sent back in charge of the most valuable records and collections. His own guides were his murderers. By his death were lost all the astronomical, meteorological and magnetic observations made during the four years of exploration.

Section 5. In 1851 the Government of the United States of America commissioned Lieut. Wm. Lewis Herndon, U. S. Navy, to explore the Amazon valley from west to east with a view to discovering its commercial possibilities. As his instructions allotted only a secondary place to geographical and scientific observations, Herndon was compelled to choose a route already known. But he instructed Lieut. Lardner Gibbon, his associate in the work, to

attempt one of the unexplored approaches to the great river, and afterwards to rejoin the main expedition.

Starting from Lima, Herndon crossed the Andes to the Huallaga, by which he entered the Marañon or upper Amazon. Farther down, his boat was accompanied from day to day by flesh-coloured river-porpoises. On the Brazilian sand-banks of the river he saw the wholesale gathering of turtles' eggs, the oil extracted from which forms an important article of commerce.

Herndon's account of the products of the Amazonian region, by bringing the wealth of a vast area into the confines of a single sentence, appeals to the imagination like a glimpse into Aladdin's garden:— "From its mountains you may dig silver, iron, coal, copper, quicksilver, zinc and tin; from the sands of its tributaries you may wash gold, diamonds, and precious stones; from its forests you may gather drugs of virtues the most rare, spices of aroma the most exquisite, gums and resins of the most varied and useful properties, dyes of hues the most brilliant, with cabinet and building woods of the finest polish and most enduring texture."

Gibbon, meanwhile, starting from Cuzco, had travelled overland to the junction of the Tono and the Piñipiñi, whose united waters form the Rio Madre de Dios, a then unexplored river of much speculative interest to geographers, for reasons which will appear later in this chapter. His plan was to descend

the Madre de Dios by canoe, to discover its course and where it emptied. This intention he had to abandon, as his Indians refused to commit themselves to a region of which nothing was known except that it was inhabited by the implacable Chunco savages.

Retracing his steps, Gibbon tried successfully another route, this time through Bolivian territory. From Cochabamba he descended the Mamoré to the Madeira, and by the latter river entered the Amazon, of which it is the largest southern tributary. The value of the Madeira as a highway of commerce is not commensurate with its length and volume, as its waters cut their way through projecting spurs of the Cordillera Geral to the Amazonian plains in a great series of falls and rapids which occupies more than 200 miles of its course. These falls were first explored and mapped in 1846, by Señor José Augustin Palacios. To the foot of the falls, the river is navigable by ocean-going steamers.

Section 6. In 1848 Alfred Russell Wallace and Henry Walter Bates began their exploration of the natural history of the Amazonian region. For the first two years they worked together, exploring the fauna and flora of the forest around Para, and of the valley of the Tocantins. Afterwards Wallace alone explored the Rio Negro, and its most westerly affluent, the almost unknown Uaupés. On this river he for the first time met with Indians whose habits had not been modified by the missionary or the trader. Here, too, he heard the curious Jurupari, or

devil music, which the Uaupés Indians produce by a set of trumpet-like instruments. These, for some unknown reason, no woman must see, on pain of death.

About the numerous falls of the Uaupés slender granitic pillars of rock "rise above the surrounding forest like dead trunks of giant trees." On this river Wallace describes also a rapid which hurls its waves forty or fifty feet into the air, as if great subaqueous explosions were taking place.

Of the vast Amazonian basin he writes:—"Its entire extent, with the exception of some very small portions, is covered with one dense and lofty primeval forest, the most extensive and unbroken which exists upon the earth. It is the great feature of the country,—that which at once stamps it as a unique and peculiar region." Some idea of the teeming life in the water of this, the greatest river system in the world, may be formed from Wallace's estimate that in the Rio Negro and its tributaries alone at least five hundred species of fish exist.

Wallace returned to England in 1852, but Bates remained in South America seven years longer, exploring the Amazon to the Peruvian boundary, as well as the Tapajos, Teffe, Jutahi, and other tributaries of its lower course. During his whole eleven years in this region Bates was constantly collecting and studying its insect life, with the almost incredible result that he discovered 8000 species hitherto unknown to science.

Section 7. It is remarkable that the *montaña* re-

gion of Peru, which stretches eastward from the lower slopes of the Andes, and forms more than half the area of the republic, remained largely unexplored until far into the 19th century. Though a region of vast potential wealth, its dark forest fastnesses maintained an impregnable front against the forces of civilization, setting a limit to the advance of the great Inca empire, and later rolling back the tide of Spanish colonization.

The name most widely known in connection with modern exploration in this region is that of Don Antonio Raimondi. An Italian by birth, he went to Peru in 1850, and devoted the next twenty years to the study of its geography, geology and zoölogy.

His explorations and researches covered almost every section of the republic, and their results were to have been embodied in a monumental work called *El Perú*; but only the first three volumes had been published when his death intervened.

In this space it is only possible to touch upon that portion of Raimondi's work which belongs to the field of pioneer exploration. In the province of Caravaya, famous for its gold, he carried on laborious researches on foot, by which he made known the courses of the numerous streams which there descend the slopes of the Cordillera Nevada. The interest of this region lay in the fact that no one knew whither all these rivers flowed, nor to what tributary of the Amazon they joined themselves. Most important was his exploration of the Ollachea (or San Gavan) and the Aya-

pata, two tributaries of the Inambari, which in its turn joins the Madre de Dios. To enter this region across the snow-clad eastern range of the Andes, the traveller passes rapidly from an arctic to a temperate, and thence to a tropical climate. His only roads lie in deep gorges or *quebradas,* shut in by sides so lofty and sheer that it is impossible to escape from them. In each of these deep-gashed valleys, Raimondi found species of birds, insects, and shells peculiar to itself, showing how long and complete their isolation. That part of the eastern slope in the province of Caravaya lying between 8,000 and 12,000 feet above the sea is subject to *neblinas,* mists so dense that objects distant a few feet become obscured.

After exploring the sources of the rivers above mentioned, Raimondi with great difficulty followed the Ollachea, called in its lower course the San Gavan, to its junction with the Inambari. He says, "Those only who have explored the dense forests of Peru, in so broken a country as this of Caravaya, can form an idea of the difficulties that present themselves." So dense was the growth of palms, tree-ferns, and bamboos, that in places his march was through darkness, though beyond the matted roof of foliage the tropical sun might be blazing. This is the home of the dreaded Chunco savages. The forest which has here its beginning, stretches without a break across the continent to the Atlantic Ocean.

By this journey Raimondi proved that the rivers

Ollachea and Ayapata enter independently the river Inambari, without either uniting with one another, or with the Marcapata, as represented in earlier maps. After a long period spent in investigating the Peruvian portion of the Amazon, Raimondi explored in 1866 the difficult passes leading from Huanta to the confluence of the Mantara and Apurimac, from whose union results the Tambo, one of the great tributaries of the Ucayali. The Tambo itself had not then been explored, but Raimondi found, at the point reached, enough water to float small steamers even in the dry season. This would give from the mouth of the Ucayali a navigable route of 1022 miles.

Section 8. During the period of Raimondi's work the Peruvian Government was encouraging all explorations that might open up a commercial route to Europe by way of the Amazon and the Atlantic, and public attention was focussed upon all the Amazonian tributaries reaching into Peru. It was generally supposed that the Madre de Dios was really the upper course of the great unexplored Purûs, and was hence looked upon as the most promising route to the Amazon. It presented, however, exceptional difficulties to the explorer, chiefly on account of the attitude of the Chuncos, through whose territory it ran. The disastrous voyage of Don Faustino Maldonado (1861) proved, however, that the Madre de Dios sends its waters to the Madeira, and not to the Purûs.

With seven companions this daring Peruvian ex-

plorer abandoned himself to the current at the point on the Madre de Dios whence Gibbon had turned back. His only boat was a light raft. Even this had to be deserted at a place of fierce rapids, and the journey was continued on foot for a day or two. Then a new raft was built, and again these adventurers committed themselves to the unknown waters. At last, to their surprise, they were carried into the Mamoré, at a point still within the country of the Chuncos. Ten days after entering this river the raft was wrecked in a furious rapid (probably the Calderao do Infierno) where Maldonado and three of his companions lost their lives. The others continued their voyage into the Madeira, and on to the Amazon, whence they returned by way of the Huallaga to their native town, Tarapoto. The result of this daring adventure was of great importance as it disproved the belief, then held by the best geographers, that the Madre de Dios was either the upper course of the Purûs, or at least an affluent of that river.

In 1866 a Peruvian and Brazilian Boundary Commission ascended the unexplored Yavari for an estimated distance of 1000 miles from its mouth. From this point the expedition was driven back with loss by the Indians.

In the same year a Peruvian expedition under Captain Vargas was sent to explore the Pachitea. In a little river steamer, it ascended the river for about 60 miles, when two of the officers were killed by the Cashibos, and the others turned back. A larger force

in three steamers, and led by Don Benito Arana, at once returned to the scene of this misadventure, and after inflicting punishment upon the Indians, pushed forward to the mouth of the Palcazu.

This tributary was ascended for some distance by the smaller steamers. The success of the expedition attracted much attention at the time, but Doctor Santiago Tavara, a later surveyor of the Pachitea-Palcazu route, was less enthusiastic about its possibilities. Other expeditions under the Government added greatly in the aggregate to our knowledge of the Amazon's Peruvian tributaries, some of which, though not free from rapids, proved navigable to steamers of light draught to the very bases of the Andes. Exploration was pushed up the Apurimac and Vilcamayo to within a moderate distance of Cuzco.

In 1852-54 Sir Clements R. Markham travelled in Peru, and explored a section of the forest region on the eastern and loftier range of the Peruvian Andes. He was in the country again in 1860-61, on a mission from the British Government to obtain cinchona plants for culture in India. This time he explored the *montaña* region a little south of the field of Raimondi's explorations in Caravaya. The rich valleys of Paucartambo, once covered with flourishing Spanish farms, he found relapsed into a state of unbroken tropical forest, so effective had been the hostility of the Chuncos, and so overpowering the vigour of vegetable life in those regions.

CHAPTER XV.

LATER EXPLORATIONS IN SOUTH AMERICA.

Section 1. In 1864 William Chandless, an English explorer who two years before had surveyed the Tapajos from its sources, began a journey which was destined to materially modify the maps of a large area in South America. Although it was three years since the wild adventure of Maldonado had upset the idea, generally accepted among geographers, that the waters of the Madre de Dios found their way to the Purûs, the latter river was still practically unknown when Chandless undertook its exploration.

On his first ascent of the river Chandless spent eight months in its exploration (June, 1864, to February, 1865). The most striking feature of the Purûs is the exaggerated tortuousness of its channel. Flowing as it does through almost level country, and unacquainted with hills throughout its course, it makes the most of its opportunities to double and redouble upon itself in a manner so involved, that sometimes a long day's journey only brought the explorer to a point a few miles, in a direct line, from his starting point in the morning. Other peculiarities of this stream are its uniformity of width and absence of rapids and islands. Its banks of light sandy soil are rich in

vegetable productions of commercial importance. Here and there cliffs of stratified sand and clay, often showing brilliant colours, abut upon the river. Chandless was struck by the evidence of enormous changes in the bed of the Purûs within very recent times.

Of the Indians, the Muras, of the lower reaches, he describes as a tribe indolent, drunken and violent. Above the affluence of the Jacaré he found the Pammarys, a peaceable race, but afflicted with a peculiar skin disease. In time of flood they retire to the lakes, where in mat huts, built upon rafts, and moored as far as possible from shore, they take refuge from the mosquitoes. Still further up the Purûs he found the Hypurinás, a numerous and formidable tribe, delighting in war for its own sake.

Not until some 900 miles from the mouth did Chandless meet with any obstruction to navigation. Beyond this, however, were frequent shallows, showing rocks of yellow and claret-coloured sandstone, and in the dry season barring the progress of large craft.

Some of Chandless's party turned back, owing to shortness of rations, and were murdered by the Hypurinás. Chandless himself, with his diminished following, pushed steadily on, through a region uninhabited by Indians, and where, in consequence, game was plentiful and unafraid. Especially noticeable, owing to their size and fearlessness, were the tapirs, those curious connecting links between the elephant and the hog. Reaching a point where the stream forked,

he explored both branches until they became narrow, rapid, and practically impassable for canoes. On the northern branch he met with a family of Indians of the forest, who had emerged upon the river-bank by chance. These were unacquainted with iron, and astonished at sight of a canoe. Their axes and cutting implements were of stone.

This journey afforded a second proof that the Madre de Dios is not the head-water of the Purûs, and made clear that the latter river does not rise among the Cordilleras of the Andes. Chandless mapped the course of the Purûs by a continuous series of astronomical observations for latitude and longitude, and true compass bearings.

In 1866 he again ascended the river, and explored for 465 miles the course of the chief affluent, the Aquiry. From the latter he made an overland journey through the forest, hoping to strike some stream belonging to the Madre de Dios; but after cutting his way for six days through the dense and tangled vegetation he turned back.

During the following year Chandless attempted to reach the sources of the Juruá, a lesser stream of the same type as the Purûs. At a point of 1120 miles from its mouth, he had a brush with some war canoes of the dreaded Navas, Indians whose boast was that they fought all comers. These warriors, although armed only with bows and arrows, spears, and round black shields, against the firearms of the explorers, inspired such a panic among the boatmen, that Chand-

less was compelled to abandon reluctantly the further ascent.

In 1868 he explored and mapped the Canumá, Abacaxis, and Mavé-assú, three inferior but remarkable rivers. Their first peculiarity is that they are not direct affluents of any main stream, but discharge into the Paraná-mirim de Canumá, a curious side-channel some 245 miles long, which forms an additional communication between the Amazon and its great tributary, the Madeira. A second peculiar feature of these three streams is that, having a width altogether disproportionate to their length, they reverse the usual custom of rivers, and narrow abruptly, as if pulled in with drawing-strings, at their mouths.

Section 2. Meanwhile (1862-63), some two thousand miles to the south, Don Guillermo Cox, a Chilian of British parentage, had been carrying out explorations in search of a new commercial route across Chili and Patagonia from the Pacific to the Atlantic Ocean. His work lay in the least known parts of the Andes south of Valdivia, where he sought a practicable pass communicating with the head streams of the Patagonian river Negro or Cusu.

Starting from the German colony of Port Montt, Cox crossed the Andes, without great difficulty, to the unexplored lake Nahuel Huapi, a sheet of water extending some forty miles by fifteen. Here he built a boat, navigated the lake, and entered the unknown river Limay, which he believed would carry him down

to the Negro. When within a few miles of the latter river, however, his boat came to grief in a rapid, and he and his party were captured by the warlike Araucanians, hereditary foes of Chili. By these he was finally released, but not allowed to proceed on his journey. Repeated attempts on Cox's part to win his way through the country of these Indians by gifts and ingratiation were met by the caciques of the tribe with an attitude of unyielding opposition. The explorer was thus prevented from traversing the route he had successfully indicated.

Section 3. Conspicuous in the annals of inland exploration is the adventurous journey of Commander G. C. Musters, R. N., who, accompanied only by a wandering band of Tehuelche Indians, traversed from south to north the vast and desolate plains of Patagonia. This journey covered 960 miles of latitude, for 780 miles of which the route lay through a country previously unknown.

On the 19th of April, 1869, Musters began his journey from the penal colony of Punta Arenas, on the Strait of Magellan, whence he struck in a northerly direction across the barren Pampa to Santa Cruz, on an inlet of the eastern coast. Here he waited till August when the winter began to break, meanwhile getting on friendly terms with the Tehuelches with whom he intended to associate himself for the carrying out of his adventure. With these companions he followed the Rio Chico nearly to its source in the west, then turning north skirted the foothills of the

Andes to Manzanas, a village of the formidable Araucanians.

Thence his route turned eastward through a country of salt lakes, mountains and deserts, till it ended at Patagones on the Atlantic coast.

The northern interior of Patagonia resembles the Pampas in character, and is watered by a few eastward-flowing rivers. Southward it changes to a boundless desert of shingle, unrelieved for hundreds of miles by mountain or river, a vast desolation where the puma breeds and hunts, an impressive and dominating solitude which grips the imagination of the traveller in these lonely regions.

Throughout the journey Musters lived, as his companions lived, by the fruits of the chase. His account of the year spent in this strange march, gives the most intimate and interesting information in regard to the character, superstitions, and habits of the Tehuelches, the true Patagonian Indians. Much has been written concerning the stature of these Indians. Schouten, writing in 1615, described them as "human skeletons 10 or 11 feet long," while D'Orbigny in his day "never found any exceeding 5 feet, 11 inches." Such accurate observers as Fitzroy and Darwin, however, estimated the average height of the men to be 6 feet, the tallest average height of any people. Musters' estimate was 2 inches less, but he describes them as possessed of great muscular strength and fine physical development, especially in the arms and chest, and

records their remarkable power of sustaining severe exertion for two or even three days without food.

Section 4. Turning again to the equatorial regions of South America we find the field not neglected. During 1868 and several following years C. Barrington Brown was official geologist and surveyor for British Guiana. He surveyed all the chief rivers of the colony, his work supplementing and extending that previously done by Schomburgk. It fell to him to discover the magnificent Kaietur Falls on the Potaro river. At this cataract the river hurls itself in great mass over a cliff 822 feet high, with a sheer unbroken plunge of 741 feet.

During the years 1873-75, as leader of a geological commission, Barrington Brown explored the Amazonian tributaries Tapajos, Trombetas, Juruty, Jamunda, Mauhes and Abacaxis, Madeira, Rio Negro, Purûs, Jurua, Javary and Jutahy, covering in all over fifteen thousand miles of this great water-system.

Section 5. While Barrington Brown was enlarging our knowledge of the southern affluents of the Amazon, Thomas P. Bigg-Wither was pioneering as an engineer in the great forests of Paraná, Southern Brazil. The object of his exploration was to discover the best route for a line of railway from Curitiba, capital of the province of Paraná, to Miranda, in the province of Matto Grosso. In 1872, with three other engineers and a body of Indians and Brazilians, he began to explore the Ivahy valley. After a year and a

half of work on this river the appearance in camp of some of the dreaded "Wild Indians" caused such a panic among the Brazilians that the survey had to be abandoned for the time.

Meanwhile Bigg-Wither undertook the exploration of the Tibagy valley as an alternative route. This work was done by boat. In its upper course, where the river yields gold and diamonds, navigation was not dangerous. But when it reached the edge of its elevated plateau its character changed, and its waters plunged furiously forward, with a fall of 600 feet in only 30 miles. In places the stream was broken into fierce cataracts by eruptions of trap through its sandstone bed. For 200 miles of its course the Tibagy was quite unknown, its torrential nature having baffled earlier explorers. Bigg-Wither, however, conquered the difficulties of this section, previously considered impassable, and successfully explored the whole course of the valley.

His work contributed fresh knowledge of the natural history of the region generally, but of special interest were his observations of the Botocudos, a curious and little-known tribe of Indians, akin in type to the Yaghans of Fuegia. These Botocudos "are amongst the rudest and most primitive of all peoples, and were long regarded and treated by the white settlers rather as wild beasts than as human beings." Their mouths are dragged out of shape and horribly disfigured by enormous lip ornaments, wooden discs two or three inches in diameter. These

are suspended from a cruel hole in the lower lip, and make it impossible for the mouth to be really closed.

Section 6. The work of Edward Whymper among the great Andes of the Equator attracted the attention of the general public as well as of the scientists. During 1879-80 he achieved the summits of Chimborazo, Cotopaxi, Antisana, Cayambe, Sarauru, and other dominating mountains of Ecuador; all of them, with the exception of Cotopaxi, virgin peaks. Of these, the highest was Chimborazo, 20,517 feet above the sea. Besides winning him distinction as a daring mountaineer, Whymper's journeys determined points of great importance to cartographers and corrected glaring errors in the previous maps of Ecuador. He discovered also that, contrary to accepted opinion, the chief peaks of the Ecuadorian Andes possess large glaciers.

A brief passage in Whymper's own words will give some suggestion of the awe-inspiring conditions under which his explorations at these great altitudes were carried on. He says:—"It is almost impossible to speak in too extravagant terms of the highly electrical condition of the Equatorial Andes. On no single occasion when we were at considerable elevations were we free from storms of greater or less severity. The whole air seemed saturated with electricity, and discharges might be determined at any moment. I think that the stray, occasional flashes which sometimes glared out between us and an intervening ridge, followed by a solitary roll, set us thinking more than

the grand displays when the whole sky was filled with fiery darts, and crash after crash pealed out without intermission; though I never shall forget the occasion when on the top of Sincholagua, and close to the summit, on a narrow ridge of icy snow in which we were cutting footsteps, a ridge so steep and narrow that the merest touch might have tumbled us over on one or the other side, we were surprised by a storm, which commenced without premonition, and in a few seconds raged above, below, and around us, with a fury which made us quiver, and maintained a ceaseless roll, as flash after flash darted across our ridge, and others struck, or appeared to strike, the rock pinnacles beneath us. With our axe-heads hissing, and not knowing whether it was more dangerous to go down or up, we at length went forward, snatched a few rocks from the immediate top, and then fled, scarcely daring to look behind, and escaped in safety, though astonished to find ourselves alive."

Section 7. Roraima, the great table-topped mountain of Guiana, already mentioned in the account of Schomburgk's explorations, had for a long time fascinated the imaginations of geographers, with something akin to the peculiar potency with which it dominated the minds of the Indians dwelling beneath its shadow. Although its total height is only 8600 feet, Roraima is of vast bulk, and lifts its crowning plateau on sheer or overhanging cliffs a bold 2000 feet above its wooded lower slopes. For untold ages its wide expansive summit had rested inviolate, an in-

accessible and mysterious island, laved by a sea of cloud.

Although Barrington Brown and earlier explorers, as well as Indians of the neighbourhood had declared the walls of Roraima unscalable, in 1884 Everard im Thurn achieved the ascent. He discovered a narrow ledge sloping up and across the red face of the cliff, and by this reached the top.

There the scene, upon which no human eye had looked before, is worth describing at some length in his own words:—"The first impression was one of inability mentally to grasp such surroundings; the next that one was entering on some strange country of nightmares for which an appropriate and wildly fantastic landscape had been formed, some dreadful and stormy day, when in their mid career the broken and chaotic clouds had been stiffened in a single instant into stone. For all around were rocks and pinnacles of rocks of seemingly impossibly fantastic forms, standing in apparently impossibly fantastic ways—nay, placed one on or next to the other in positions seeming to defy every law of gravity—rocks in groups, rocks standing singly, rocks in terraces, rocks as columns, rocks as walls and rocks as pyramids, rocks ridiculous at every point with countless apparent caricatures of the faces and forms of men and animals, apparent caricatures of umbrellas, tortoises, churches, cannons, and of innumerable other most incongruous and unexpected objects. And between the rocks were level spaces, never of great

extent, of pure yellow sand, with streamlets and little waterfalls, and pools and shallow lakelets of pure water; and in some places there were little marshes filled with low scanty and bristling vegetation. Here and there, alike on level space and jutting from some crevice in the rock, were small shrubs, in form like miniature trees, but all apparently of one species. And as far as eye could see, no trace or movement of animal life."

Section 8. A river which has attracted much attention and yet baffled explorers is the Pilcomayo. As this river rises in the interior of the Bolivian highland and debouches into the Paraguay below Asuncion, it would, if navigable, prove a commercial route of much importance. Its attempted exploration in 1882 by Dr. Jules Crevaux of the French Navy gained it a tragic notoriety. Dr. Crevaux and all the members of his expedition were murdered by the Indians. In 1890 Lieut. O. J. Storm ascended it in a specially constructed steel steamer for more than 300 miles, until the stream apparently lost itself in a wide swamp, although in reality nowhere near its source. This journey, however, proved it impracticable for purposes of commerce, chiefly owing to its shallowness and the unbelievable number of snags which fill its channel.

Meanwhile progress was being made in the great basin drained by the Madeira. In 1880-81 Dr. Edwin R. Heath had explored the Beni, and four years later Fray Nicolas Armentia ascended the

famous Madre de Dios for about 200 miles. The ascent of this stream was completed by Colonel Pando in 1892, who found it a clear and majestic river, full of islands, and flowing through a region by nature one of the richest in the world.

In 1892-93 a special Brazilian commission did exploratory work in what has been called "the Brazilian Island," from which waters flow into all the important fluvial systems of South America. In 1894 G. G. Dixon discovered the source of the Barima river in British Guiana, a point of some importance in the boundary dispute between that country and Venezuela.

Until the closing years of the century no part of South America offered greater opportunities to the explorer than Patagonia. In a paper published in 1897 Sir Clements Markham described as *terra incognita* a vast strip along the eastern side of the Patagonian cordillera, of about the area of all of England. Patagonia is in all a strange land. Owing to the fact that it shows evidences of instability in its geographical structure, and of great physical changes in recent time, it has exceptional interest for the geologist. After the journey of Commander Musters little was done to add to our knowledge of the country until 1880, when Dr. Hans Steffen began explorations among the Patagonian Andes which extended over a period of ten years. But the man who finally removed from the map the great blank to which Markham referred was Don Francisco Moreno, a very dis-

tinguished South American scientist. His maps and the results of his explorations published in 1899 made a most important addition to geographical knowledge.

Mention must be made of Col. George Earl Church, to whom we owe a definite conception of the ancient Pampean Sea. Going back to several years before the period treated in this section we must also mention the explorations in Terra del Fuego by the staff of the *Challenger* as an incidental item in the course of "the greatest scientific voyage ever undertaken," a voyage which may be said to have given birth to the new science, oceanography.

Whymper's work in the mountains of Ecuador had attracted the attention of scientific mountaineers to the inviting field for achievement offered by the Andean range. In 1897 Edward A. Fitzgerald led an expedition among the High Andes of Argentina. His work lay in "a barren land where sandstorms blow all day over a desert of loose shale." Mr. Vines, a member of this expedition, achieved the summit of Aconcagua (23,080 feet), the highest known peak in South America. This was probably the greatest height up to that time climbed by man in any part of the world. The expedition also explored Tupungata and other neighbouring peaks. In the following year Sir Hugh Conway succeeded in reaching the summit of Illimani (21,200 feet) and other giants of the Bolivian Andes, adding much to our knowledge of this great range.

PART SIX.

EXPLORATION IN AFRICA.

CHAPTER XVI.

AFRICA AT THE OPENING OF THE CENTURY.

Section 1. Until quite recent years the vast continent of Africa remained the least mapped division of the earth. But so great a field for exploration, with the enchanting possibilities of the unknown, could not remain unexploited, with the growing earth hunger of the nations urging man on. Just how much the ancients knew of the interior cannot now be ascertained. The fruits of such explorations as they developed have withered long since. The Great Desert belt cut off investigation from their seat of civilization, Egypt, till the introduction of camels by the Arabs.

With the organization of the "African Society," at London, in the latter half of the eighteenth century, began a new era in Africa's story. Under the auspices of this Society important work was done in

the field by Houghton, Mungo Park, Hornemann, and Burckhardt. The association merged into the Royal Geographical Society in 1831. During the nineteenth century more was done to acquaint the world with the geography of Africa "than during the whole of the 1700 previous years since Ptolemy taken together." "The exploration of Africa, almost wholly effected in modern times . . . . is a subject which has a literature of its own. The systematic, scientific examination of the continent by travellers had its origin in 1788, when the African Association of London was founded,—though James Bruce, a Scot, had, in the period between 1768-73, made much research in Abyssinia, travelling from Massowah to the sources of the Blue Nile, and returning to Egypt by way of Sennaar and the Nubian Desert."

The name that stands in the forefront of African exploration is that of Mungo Park. He it was whose achievements turned the eyes of the world toward the mysteries of the Dark Continent. His work extended over the first six years of the nineteenth century. In 1795 he penetrated from the Gambia on the west coast to the Niger, followed the latter to Silla, and fixed the southern limits of the Sahara. In 1805 he undertook a second journey to the same regions, planning to descend the Niger to its mouth. This expedition cost the explorer his life. He made his way past the city of Timbuktu, and reached Boussa, where he was killed by the natives while crossing the river in a canoe. He had fortunately

sent back his letters and journal from Sansanding on the Niger in November, 1805. The first white men on record as having traversed the continent from ocean to ocean were two Pombeiros, or Portuguese traders, who, between 1802 and 1806, crossed from Angola eastward through the territories of the Muata Hianoo and the Cazembe to the Portuguese possessions on the Zambesi.

In 1816 an expedition was sent out by the British Government, Captain Tuckey commanding, to the Congo, which was popularly believed to be the lower course of the Niger. "This was a disastrous undertaking, and the additions to geography were slight, the river being ascended but two hundred and eighty miles."

Section 2. About 1816 an attempt was made by an expedition under the command of Major Peddie of the British army to follow Park's route from the Gambia. With one hundred men, including Captain Campbell, he started up the Rio Nuñez, but succumbed to fever before many days, leaving his brother officer to head the company.

Campbell reached the Fulah country, but was badly treated by the natives in general and especially by their ruler, who detained the white men four months for ransom. A large amount was extorted from the commander for mere permission to return by the way they had come. But the brave captain and most of his followers died on the homeward journey, and were buried at Kakundi under the orange trees near the

factory of an English resident. In September, 1818, Mr. Ritchie, " a man of science and ability," was sent by the British Government on a mission to the interior of Africa. On the way he was joined by Captain Lyon, who volunteered his services, and together they landed at Tripoli, making that place the starting point of the journey which carried them a short distance beyond Mourzook, where Mr. Ritchie died. Captain Lyon then explored Fezzan till his supplies were too reduced for safe travelling, and returned to Tripoli, only when a further advance seemed hopeless. Underground villages of agricultural natives, corn and saffron fields, orchards of apple and almond trees in bloom, Roman ruins, cultivated olive and fig trees, and strange " new " animals, are among the details of interest noted by this traveller. The village of Garian was notable, among many similar places, for the " excellence of its oil, the richness of its saffron, and the goodness of its corn," as Captain Lyon's journal quaintly has it. With their tall, straight, muscular bodies, and handsome oval faces,—dark-skinned from much exposure,—he found his Arab acquaintances intelligent, energetic, and capable of enduring both fatigue and abstinence. Lyon remarked not only of the Arabs and their camels, but of all the animals in the country he visited, that they could remain a very long time without water. Of the Arabian horses he observed that they were kept underfed to modify their good looks, lest they be demanded as tribute by the powers. These horses wore shoes for

mountain and hill work, but ran free-footed in the desert. White, wolf-like dogs and elfish children played and ate together, and the latter hospitably pressed upon the travellers gifts of sour buttermilk and "teefaas,"—a root like potatoes in looks and like mushrooms in taste and smell—to Mr. Ritchie.

Cooscooscoo, Bazeen, and Zumeita—flour pastes—served them as food. Dancing and a game called Helga kept them amused. They called the Atlantic "Sea of Darkness," and thought the countries "in the sea" (i. e. islands) had neither sun nor moon. They wondered why the people living on the islands did not fall off into the water and they had no great respect for folk who dwelt so precariously.

Over the desert Klïa, past the Elood and Guatela Mountains, and through many villages, went the mission to the town of Sockna, which was situated in an immense plain bounded by the Soudah, Wadan, and Guatela mountain ranges, and surrounded by more than two hundred thousand date-trees, the fruit of which was superior in quality to any in North Africa, a fact which even the horses appreciated. At Sockna the natives spoke a language peculiar to themselves, which was supposed to be the original Berber tongue. The people of Sockna proudly claimed that this ancient language was the speech of Noah himself.

To Hoon, to Emzairaat, to Mesheil, and across the desert of Sbir ben Afeen (where they observed that the air was so dry that putrefaction was arrested, dead

animals being seen quite shrivelled but not decomposed), marched the travellers, reaching Samnoo to find "the best Arab cooks" of the journey. Thence still forward, from palm-encircled Sabha, in the midst of the dreary desert, to Wad el Nimmel ("valley of ants"), so called "from immense numbers of these insects of a beautiful pink colour." At last, traversing a great desert plain, the mission entered the "palm groves and gardens of Mourzook," the capital, —a walled town of twenty-five hundred black inhabitants. Lyon, attacked by dysentery and seriously ill, made great demands upon his constitution, but quickly recovered his strength and was able to care for his friend Ritchie, who was down with fever and raving in delirium.

Section 3. There were times when Lyon and Ritchie found themselves in straits from lack of food, no help being forthcoming from the neighbouring but unneighbourly sultan. But all the deprivations and sufferings were cheerfully endured in the cause of discovery and the development of their plans. Many tales of absorbing interest were told by traders concerning the countries of the interior, and especially as to the wonders of Lake Tchad. But Ritchie's courage and strength at last gave way under an acute attack of the fever which had remained in his system from his first illness. On the 20th of November, 1819, his brave spirit gave up the struggle.

Captain Lyon, thus left alone in the perilous venture, decided to continue the journey as far beyond

Mourzook as his resources would permit. Fighting against illness, and very weak, he pushed onward obstinately. At Zulla he found the inhabitants white, and very proud of their direct descent from Mohammed. The "most respectable, hospitable, and quiet people in Fezzan, and their whole appearance (for they were handsome and well-dressed) bespeaks something superior," was Captain Lyon's comment upon them. At Terboo, the "most wretched village . . . . met with," he kept Christmas day by drinking a bumper of coffee to the health of his friends in England.

This stage of the expedition covered a great salt country, that necessary mineral being seen lying upon the ground like snow in crystal flakes. Gatrone was notable for its young Tibboo girls, of the "brightest black" colour, who, adorned for Mohammed's birthday, presented a most attractive appearance. Tegerry brought the Englishmen to the southern limit of Fezzan where the cultivation of the palm ceases and the desert begins.

Before leaving Mourzook, Captain Lyon and the inhabitants exchanged presents expressive of their mutual good will, and on the 9th of February, 1820, the Expedition set out for Sockna. Their route took them through Neshona, Ghroodwa, Sabha, Temenhint (the "most inhospitable town in Fezzan"), Zeghen, and past the Kohol Mountains. At Sockna they helped the natives to celebrate, with song and dancing, the "first of Spring" (28th of February).

Passing through Bonjem and Zemzem, they arrived at Zleetun where their desert-weary eyes again saw the sea; and Captain Lyon roared "Rule Britannia" and "God Save the King" till they thought he had gone mad. By way of Lebida they reached Tajoura, there to be met by Dr. Dickson, the consul, Colonel Warrington, Messrs. Carstensen, and others, to welcome them back to civilization; and on the 25th of March, 1820, they re-entered Tripoli—exactly one year after they had left it.

Section 4. In 1822 the English Government sent out an expedition, under Lieutenant Clapperton, of the army, and Dr. Oudney, a naval surgeon and naturalist, to explore the course of the Niger. They started, as Ritchie and Lyon had done, from Tripoli, and were joined by Major Denham, an old "Peninsular" officer, who had set out on a similar expedition under the auspices of the African Association. Making their way towards Mourzook, they halted at the walled town of Sockna, a half-way place.

Though, unlike all earlier Englishmen who had penetrated into the interior, they wore no disguise, they were accorded a most gratifying reception by the governor. From Sockna the travellers moved out across the desert, but after suffering greatly from water famine and sand storms they reached Mourzook only to meet a most disappointing reception from the Sultan, of whom they sought an escort to Bornu. Finding that neither bribes nor persuasions could move that potentate, Denham returned to the Basha

of Tripoli, who had promised them aid, but found him equally reluctant to help the expedition forward. It was only Denham's threat of appealing to his own government that brought the Basha to terms. Returning from Tripoli, Denham found Clapperton and Oudney both ill with fever at Gatrone; but by the end of November they were well enough to travel, and the journey was resumed.

After crossing the Tibboo desert, strewn with the skeletons of those who had perished in earlier expeditions, Dherka was reached soon after New Year. On the 4th of February they arrived at the town of Lari, and looked upon the wide waters of Lake Tchad. The natives of Lari, mistaking the caravan for a war-party, fled in panic into the forest. On reaching the shores of the lake they found it tenanted by thousands of birds of brilliant and varied plumage, including ducks, pelicans, yellow-legged plovers, and cranes four or five feet high. From Lari the expedition proceeded along the shores of the lake, and after a four days' journey Bornu itself was entered for the first time by Europeans. From Bornu they pressed forward to Kouka, where they were hospitably received by the Sheikh. Here Clapperton and Oudney rested, while Denham joined a slave-hunt which carried him to the country of the Falatahs. The invaders were defeated, their leader killed, and Denham, after having been stripped naked by the conquerors, barely escaped with his life. On reaching Kouka again he found Oudney in the last stages

of consumption and Clapperton shaking with fever, yet both preparing to press forward to the exploration of Soudan. Though they failed to ascertain the source and termination of the Niger, they succeeded in determining the positions of the kingdoms of Mandara, Bornu, and Houssa, and of their chief towns.

At length, they were forced by Oudney's increasing weakness to halt at Murmur, a town on the borders of the Houssa territory. Here, while planning the next advance, the heroic Oudney breathed his last, and was buried under a Mimosa tree.

Though still a sick man himself, Clapperton now resumed the journey resolutely. He reached Kanan on the 20th of January, 1824; and a month later arrived at the important town of Sokoto. At Sokoto he was cordially received by the Sultan, who at first promised him an escort down the Quorra river. Afterwards, however, the fickle ruler declined to sanction this venture, as being too perilous; and after six weeks of delay Clapperton, finding that the poor remnants of his health were giving out, turned back in haste to Bornu.

Meanwhile, Denham, accompanied by a young Englishman, by the name of Toole, "who almost alone had traversed the long route from Tripoli to Bornu," set out to visit the Shary and the Logon. After leaving Angornou they proceeded along the eastern border of Lake Tchad to Angola, and reached the Shary, which they found to be a half mile in width and flowing at the rate of two or three miles

an hour towards the lake. Owing to the unsettled state of the country and to an illness from which Toole was suffering they could not stay long in any one place, but managed at last to reach Logon on the Shary. They found the inhabitants of the country thereabouts industrious and partly civilised. On their way back to Angola, Toole grew rapidly worse, and shortly after their arrival he died, leaving Denham, alone and disheartened, to make the best of his way back to Kouka. Here he found Clapperton, just arrived from the Soudan. Together they left Kouka on the 16th of August. Arriving at Tripoli on the 28th of January, 1825, they took ship for London. During their great journey, which occupied three years, Denham and Clapperton explored from the east side of Lake Tchad to Sokoto, a distance of seven hundred miles from east to west in the heart of Africa.

Section 5. In September, 1825, the indomitable Clapperton, now a captain, undertook a second journey. He was accompanied by Dr. Morrison and Captain Pearce, both of whom died within a month of the start. From the coast of Guinea he crossed the Kawawa and entered the kingdom of Yarrita, to be kindly received at its capital Katunga. He then went to Boussa (where Mungo Park died), and to the kingdom of Zegzeg, the capital of which, Zaria, he found to contain no less than 50,000 inhabitants. Arriving finally at Sokoto, he achieved the distinction of being the first European traveller to cross Africa

from the Guinea coast to the Mediterranean. At Sokoto, Clapperton found the Sultan no longer friendly as before, and was so depressed by his reception that he fell ill of fever, and died on the 13th of April, 1827. The Sultan being somewhat moved by his death, his followers were allowed to perform the funeral rites with every mark of respect. The leadership of the expedition now devolved upon Richard Lander, Clapperton's personal attendant and companion.

After an unsuccessful attempt to trace the Niger to its outlet, Lander struggled out of the wilderness, and reached the coast at Badagry on the 21st of November, 1827.

The second journey of Clapperton added ten-fold to the value of the results of his first expedition. He had the good fortune to find the shortest and easiest route to the populous countries of the interior, and he could boast of being the first man who had "completed an itinerary across the continent from Tripoli to Benin."

While Clapperton was out on his second journey, Major Loring undertook to penetrate to Timbuktu. From Tripoli he crossed the Kafila desert by way of Gadames. He was attacked by a ferocious tribe of natives, wounded twenty-four times, and left for dead. But by the careful attentions of his companions he recovered, and succeeded in reaching Timbuktu, only to be murdered a little later by a treacherous Moorish guide while attempting to reach Sego.

CHAPTER XVII.

AFRICA AT THE OPENING OF THE CENTURY (*continued*).

Section 1. Owing to the hostility existing for many years between the Ashantees and the Fantees, their part of the country was unsafe for foreign merchants, and the European trade was interrupted. The African Association therefore decided to send an embassy to Ashanti, with the double purpose of exploring its territories and negotiating a treaty with its ruler.

A mission, consisting of Messrs. James (the governor of the fort at Akra), Bowdich, Hutchinson, and Teddlie, left Cape Coast Castle on the 22nd of April, 1817, and arrived at Dadawasee on the 14th of May. Under the escort of an official sent to meet them by the king of Ashanti, the party entered Coomassie. Passing under a fetich, or sacrifice of a dead sheep wrapped in red silk and suspended from lofty poles, they were greeted by five thousand warriors with bursts of martial music. They were received by the king with encouraging courtesy; and at first everything seemed to promise success. At a later interview, however, the king advanced a claim for cer-

tain sums alleged to be due from the British for the privilege of holding fortified factories in the country. Mr. James, though leader of the embassy, felt himself unwilling to take the responsibility of settling this question, and was thereupon accused by the king of having come to spy upon his resources. At this critical juncture, Bowdich, realizing the peril that threatened the expedition, by the exercise of great tact succeeded in appeasing the excited monarch. Mr. James being recalled shortly afterwards, Bowdich was made head of the mission. In this capacity he concluded a treaty which satisfied the king's demands and threw open the Gold Coast to British settlement.

Section 2. In 1818 M. Gaspard Mollieu, a young Frenchman, was sent out by his government to discover the sources of the Senegal and Gambia rivers.

Equipped with merely a donkey-load of stores and trading goods, and with a single Marabout as escort, he left St. Louis at the end of January and proceeded southwest through the lands of the Jal-oofe and the Foulahg. "Here detained as prisoner, there compelled to join some predatory excursion, but everywhere escaping with his life by dint of the exercise of unfailing patience and tact," he ascended the Senegal to Bondu, which he entered on the 15th of March. There he discovered water communication between the Senegal and Gambia, and, after wandering through dense forests watered by the latter river, he

discovered the sources of both the Gambia and the Rio Grande,—"situated within a short distance of each other in two thickets on one of the heights of the lofty mountains called Badet."

To accomplish the second purpose of his mission he proceeded to the ancient city of Timbo, close to which the Senegal was believed to have its rise. There he narrowly escaped being murdered at the hands of the natives, who considered the Senegal so sacred that they threatened death to anyone attempting to discover its birthplace. By means of a considerable bribe, however, he persuaded a guide to lead him to the river's source,—"hidden from view in dense woods, never penetrated by the sunbeams, about half way up an exceedingly steep and rugged mountain." After successively exploring three basins, one above the other, and after learning that the Senegal was the same as the Bafing or Baleo, which Park had erroneously considered identical with the Niger, Mollieu set out for home by way of Timbuktu. Just as he seemed to have triumphantly accomplished his task, he was taken seriously ill with fever at Bandeïa and compelled to remain for a month among a hostile people who attempted to kill him for the sake of his scant property. On the 12th of June, he was able to resume his journey. Relinquishing all idea of visiting Timbuktu, he travelled in a northwesterly direction and reached the coast by way of the Portuguese settlements of Geba and Bissao. He returned to St. Louis, after a year's absence, by way of Goree,

and six weeks later, though weakened by fever and fatigue, continued his voyage to his native land. In March, 1819, he reached Paris where the story of his achievements aroused a wide interest.

After the failure of Peddie and Campbell, another expedition was sent out, in 1818, under the command of Major Gray and Dr. Dochard. Wishing to avoid Timbo, the capital of the Almani, they sailed up the Gambia, and after travelling through Tonli and Galu reached Bondu. There the king demanded from Gray, "on pretext of some old debt due from the British Government," such a quantity of goods that the resources of the expedition were exhausted. In the hope of buying permission to continue the journey, Gray sent to Senegal for more merchandise, and succeeded in covering most of the ground explored by Park. But the people were found to be as hostile as when Park visited them, thirteen years before. Dochard, weakened by privation and disappointment, was seized with fever, and presently added his name to the long list of those who have given their lives to solve the dark riddle of Africa. The whole expedition had meanwhile melted away by death and disease.

Section 3. René Caillié, inspired by reading "Robinson Crusoe" and such adventurous tales, was seized at the early age of sixteen with an irresistible longing to explore new lands. With just sixty francs in his pocket, the enthusiastic boy left France and started alone for Senegal (1816). When he reached

St. Louis the English expeditions into the interior were the sole topic of conversation. Fired by the hope of joining one of these expeditions, Caillié travelled on foot to Dakar, and thence by boat to Goree. There, however, he was dissuaded by a kindly French officer, and accepted a passage to Guadeloupe. Soon afterwards an accidental reading of Mungo Park's travels so revived his old enthusiasm that he seized the first opportunity to return to Goree, where, in 1818, he succeeded in attaching himself to Major Gray's expedition. At Bakel he was so weakened by fever and over-exertion that he was obliged to return to France to recruit his health. Strong in his purpose, however, he went again to Senegal in 1824, and spent some time among the Brackmar Moors, in order to acquire a knowledge of the Arabic language and the religions and customs of the country. Under pretence of being a convert, he succeeded in being initiated into the mysteries of the Koran and Mussulman prayers, and, after learning to speak, read, and write Arabic, he returned to St. Louis to apply to the Government of Senegal for assistance in a journey to Timbuktu. He also wished to cross Africa to Egypt in the guise of a merchant and pilgrim to Mecca. The Government of Senegal refusing to aid him, he went to the English colony of Sierra Leone, where Sir Charles Turner, the governor, set him to superintend some indigo plantations at a salary which enabled him to save within a short time two thousand francs.

Converting his whole capital into merchandise use-

ful for barter in the interior, and resuming a complete Arab disguise, on the 22nd of March, 1827 (three years after his arrival in Africa), he set out on his journey, and at the end of the month reached Kakondy, a village near the mouth of the Rio Nuñez. His stock of goods was too small for him to pretend to be a trader as he had planned,—but he had his story ready. "Born in Egypt," he told everyone, "I was taken as a child and made to serve in the French army, which was then in Egypt. I was brought as a slave to France, and my master took me with him to Senegal to assist him in his business. He was so pleased with my services that he gave me my liberty, and now that I am free to go where I will I naturally desire to return to Egypt to find my parents and resume the Mussulman religion." This fable of his origin led to a courteous reception from the Mandingo and other merchants in the village, and, on the 22nd of April, he started for the interior with a caravan consisting of five free Mandingoes, three slaves, a Foulah porter, and a guide with his wife. Proceeding along the left bank of the Rio Nuñez, the party after two hours' march came to the Betleman factory in the garden of which were the graves of Major Peddie and his companions. Undaunted by this grim reminder, Caillié proceeded on his way with energy, in an east-north-east direction, stopping now at a Foulah camp and now at a quiet village, and halted for two days at Pandeya (a village of 150 or 200 inhabitants) to take part in the Mohammedan festival of the Ramadan,

sharing alike in the feasts and the prayers as a true Mussulman. Passing through the Futo-Jallou country, he came to the banks of the Niger at Kurnsa, crossed the great river by canoe, and reached the important town of Kankan. This town he described as being "well-kept . . . . with broad streets shaded by date, baobab, and other trees, situated on the left bank of the Niger, and containing some six thousand inhabitants."

After a month's delay awaiting an escort to Jenneh, Caillié left Kankan on the 10th of July, and rapidly traversed one district after another till he reached Timé on the southern border of Bambarra, where he was taken ill and compelled to remain four months. There, during his illness, he was constantly annoyed by the natives, who demanded more gifts than he could supply, and accused him of having hidden wealth. "Lying in a miserable hut, with no pillow but his leather travelling bag, and unable to eat anything but a little rice," he experienced his first depression, and felt that he could never reach civilization again. But on the 9th of December, he was able to join a caravan of five Mandingo merchants bound for Jenneh, which remote town Caillié was the first European to visit. The country through which they passed was fertile and thickly populated with peaceful Mandingoes professing Mohammedanism.

The city of Jenneh was the principal trade centre of that part of Africa, and its bazaars offered for sale all kinds of European manufactures. Many of the

citizens were wealthy and comparatively refined, and believing Caillié's story they made up a purse to pay his expenses to Timbuktu. On the 13th of March, 1828, he set out again, but, as he was the only white man among many negroes, the voyage was far from pleasant. There were times when he had scarcely enough food to sustain life; but though suffering greatly he never failed carefully to observe the character of the country through which he passed. Just one year after the start from Kankondy, Caillié arrived at Cabra, the seaport of Timbuktu. Here "secure in his disguise, he mingled freely with the crowds in the streets.....attending the daily markets held for the supply of necessaries to Soudan traders,.....acquainted himself, in a word, with all the most notable peculiarities of this rendezvous of natives from the North, South, East, and West of Africa." Accompanied by a Tuarick Arab he proceeded on horseback to Timbuktu. "After all he had heard of its magnificence, the first sight of the city, consisting as it does of a mass of ill-built earthen houses, was disappointing; but gradually its aspect, rising up from the midst of yellow sands and attesting the courage and patience of its builders, won his admiration, and he felt that it might indeed be called the Queen of Western Africa." Mohammedan enough not to arouse suspicion, he lived for two weeks in a house opposite the one once occupied by the unfortunate Laing. Kindly treated by the citizens, who begged him to prolong his stay, Caillié was neverthe-

less eager to return to civilization, and urged his desire to be with "his own people in Egypt."

On the 4th of May, therefore, he set out across the Great Desert, and arrived on the ninth at the celebrated desert emporium, El Arawan, near which Laing was murdered. Here, for the first time since assuming the character of an Arab, Caillié was an object of suspicion, and it was only by redoubling his zeal in observing religious duties that he removed the distrust of the natives. With a caravan of 1400 camels he made the journey to Talifet, on the desert side of the Atlas Mountains, in a three weeks' struggle against the terrors of drifting sand, burning east winds, scarcity of water, and finally scurvy. The 2nd of August, 1828, brought the company to this town, seventy-five days from Timbuktu, where Caillié begged in vain for help from the Moorish Government to enable him to reach Fez. It was only by at last selling some native apparel that he raised enough money to hire a donkey. The 12th of August found him at Fez, triumphant. Six days later he reached Rabab, a seaport near the Straits of Gibraltar, but the French consul at this point refused to help him. With great difficulty he struggled on to Tangiers, where he was enthusiastically received by the vice-consul, M. Delaporte.

On his return to Paris he received the reward of 10,000 francs which had been offered by the French Geographical Society to the first traveller who should

penetrate to Timbuktu and bring back an authentic account of that mysterious city.

Section 4. The honour of being the pioneer European to enter Timbuktu was claimed also for Major Alexander Gordon Laing (1826), who succeeded in reaching the place from Tripoli, only to be murdered in returning across the desert.

His greatest work as an explorer, however, was done in Kambia and the Mandingo land, in ascertaining the state of the country, the disposition of the inhabitants towards trade and industry, and their sentiments and conduct as to the abolition of the slave trade. Laing was commissioned by the British Government (January, 1822) to advise the natives to cultivate white rice, cotton, and coffee for the English trade and their own betterment, and to deal fairly in all such intercourse as should come from their growth and development. Having fulfilled his mission at Kambia, Laing crossed the river Scarcies and marched to Malacouri, a strongly fortified town on the river Malagera, where he learned of native hostilities, and tried (though ill with "fever and ague") to make peace and release the captives.

After reporting at Sierra Leone, Laing started again on his embassy with Assistant Surgeon Mackie, and reached the towns of Malagera and Fouricaria (Boukaria) successively. The white men were objects of intense admiration to most of the natives, and one chief, observing Laing taking off his gloves, stared in surprise, covered his widely opened mouth with his

hands, and at length exclaimed, "He has pulled the skin off his hands!"

Again returning to Sierra Leone, Laing suggested to the governor of Western Africa that an opening of trade between the natives and the colonists might be commercially advantageous to both, as he had observed considerable quantities of gold and abundant ivory in the possession of the men of the army in Soolima. The governor arranged that Laing should penetrate into the country of the Soolimas to open the way and complete his observations. The brave officer once more left the English settlement, and travelling up the Rokelle river visited the chiefs of Maharre, Rosa, and Macabele by water. Shallows preventing further progress by boat, Laing proceeded on foot to Rokon, and thence through a beautiful country to the small orderly town of Terre, surrounded by rocks and plantain trees, and to the village of Toma, where, though it was not more than sixty miles from Sierra Leone, he learned that no white man had preceded him. At Toma the sight of the strangers so astonished a woman whom they met that she stood fixed like a statue, and stirred not a muscle till the whole party had passed, when she gave a loud cry and covered her face with her hands.

Through Rodoma, Mokundoma, and Romontaine, holding "palavers" all the way, went Laing on his civilizing errand, and arrived at Balanduco, "the only town of importance since Rokon,"—where the

manufacturing of palm oil to the amount of thirty or forty gallons a day was the industry of the women.

At Ma Yerma the travellers were most inhospitably received; but at the town of Ma Yosso they were plentifully supplied with food by a "very superior, but scantily attired" people, which so encouraged them that they made a quick march to Ma Boom. A strange secret association called the Purrah was greatly dreaded by the inhabitants of this land. Its members lived in the woods and plundered towns and villages at night, taking people, provisions, and clothing, unhindered. They were really in control of the general government,—all disputes between towns being arranged by them,—and were a serious obstacle to the civilization of the superstitious race which they terrorized. The agricultural productions of the country were quickly enumerated, for white rice, red rice, yams, plantains, ground nuts, bananas, and cassava comprised the staples. These were cultivated with the crudest of implements. Intoxication among these blacks was of frequent occurrence, palm wine being very abundant; and only enough work was done to keep them well supplied with food.

At the town of Ma Boom, however, more enterprise and industry had developed regular trades among the Mandingo inhabitants,—a shrewd race from the gold country of Manding, distinguished in the travellers' eyes by their simple and rational costumes. They wore a kind of short trousers, the width of which was a mark of distinction with them;

so that the title "wide trousers" was a synonym for great man.

At Kooloofa, Laing was honoured by the chief as the "first white man who ever set foot" in the town.

Reaching Seemera he was visited by the king, who "thanked God that he had seen a white man" before his death, and helped Laing on his way by every means in his power. A beautifully diversified country led the explorer with his companions to a "large, clean place," surrounded by lofty mountains, and called Nyiniah. At Neta Koota the natives were employed in extracting iron from the laterite by means of earthen smelting furnaces.

At Kamato, Laing was ill with fever for five days. He was met there by two horses sent by the king of the Soolimas from Falaha. One of the king's messengers had been at the camp in the Mandingo country, and he, recognizing Laing, leaped for joy and cried, "It is true! He is the white man from the water side. . . . He is the white man who said he would walk to this country, and he has kept his word!" None of the natives could tell Laing how far the kingdom of Kooranko extended to the East, none of them ever having travelled there. They said the people beyond were "savages,"—cruel, naked, and barbarous.

Although Laing was considered by the blacks to live like a prince, his whole expenditure for washing, lodging, food, etc., did not average more than four pence per diem. Nourishing vegetables and fruits,

such as yams, rice, plantains, wild spinach, ground-nuts, pineapples, and bananas, were so plentiful as to be incredibly cheap in the markets.

From Kamato the expedition crossed the Rokelle on a native bridge of three slack ropes,—two for the hands and one for the feet, and stretched from tree to tree.

The King of Falaha, on welcoming Laing to his kingdom, presented him with two massive gold rings, and invited the "faithful white man" to a seat at his side. Later a horse was delivered at Laing's hut with the king's compliments.

At this place he was laid up with a fever which came near terminating his explorations and his life together. On recovering, he visited Gangooia, a very large town ten miles from Falaha-land, surrounded by country in a high state of cultivation, and evidencing a superior agricultural knowledge on the part of the native farmers.

Major Laing believed the sources of the Niger to be at no great distance from Falaha; but he was unable to visit them, because the natives held the place sacred. He explored, however, the head of the Rokelle, which he was first of his race to visit, and said of it, "It is the only river in Africa, with which I am acquainted, which bears the same name from the source to the sea."

Just before leaving Falaha he gave a grand entertainment and ball to the town, which cost him the extravagant sum of "seven and sixpence!" The

appreciative king said, "you English are good people . . . . You walk long journeys . . . . to help us."

After a three months' stay, Laing took his departure from Falaha, enriched by a valuable present of gold ornaments and ivory, some beautiful cloths, and a saddled horse. He parted from the good king with deep regret and sincere feeling on both sides. He had opened the road to Sierra Leone for trade and enlightenment. On the way home, at Maherre, he had the gratification of shaking hands with a Portuguese official, Señor Altaville, and Captain Stepney of England, who had come out to meet him. Later they were joined by Kenneth Macaulay, and the whole party embarked in a barge which carried them to Tomba, where Laing wore English clothes for the first time in seven months, his own having given out long since and been replaced by native garb.

Section 5. It was Richard Lander who, by his descent of the last eight hundred miles of its course, succeeded in clearing up once and for all the mystery of the mighty Niger. He was accompanied by his brother John. The journal of their travels tells the story of some of the most remarkable explorations ever accomplished. No geographical problem excepting that of the "North West passage" had busied the conjectures of so many men as the direction and termination of this great African river, the Niger.

Richard Lander, Captain Clapperton's attendant on his last expedition, and the only one of his party to return to England in safety, left Portsmouth with

his brother on the 9th of January, 1830, and arrived at Badagry on the 22nd of March, where the ruling monarch supplied his own war canoe for the explorers' transportation to Bornu. At that place (where Clapperton once landed) donkeys, parrots, alligators, hippopotami, wild ducks, etc., gave life to the landscape. Both the brothers were interested in natural history; and at the large town of Wow this interest was particularly aroused by an incredible number of butterflies of the most brilliant and varied colourings, such as "sky blue and silver, purple and gold, green and gold, black velvet and lace." At Bidjie (the place where Pearce and Morrison fell sick on the previous expedition) the king, in a robe of green silk damask, and a skull-cap of purple and crimson velvet, offered the travellers every hospitality, shook hands, and drank their health in rum. Again at Larro the brothers were greeted with great kindness by a cleanly, orderly people, governed by a chief in velvet robes and yellow leather boots. The moated town of Jenna boasted the usual bedizened ruler with his usual background of wives, with whom the Landers exchanged the usual compliments and goora nuts, and by whom they were presented with yams, milk, honey, and a goat, in acknowledgment of the usual courtesies of red cloth and beads.

Beset by ants, mosquitoes, worms, centipedes, and other crawling creatures, the Landers passed through large groves of stately trees to the great town of Egga. Beyond Egga they found immense planta-

tions of cotton, indigo, Indian corn, yams, etc. Passing mountains of wonderful shapes, they visited the populous town of Dufo, where the industry of the inhabitants had made the region wealthy. At Acboro they were very pleasantly entertained, and on their taking leave the governor remarked, "White men do nothing but good. I will pray that God may bless you, and send more of your countrymen to Yarriba." Beyond Cootoo the "soil became richer and deeper, the verdure more cultivated and thicker, and the trees more luxuriant," and the way led to the great town of Bóhas, fortified, moated, and triple-walled, where their welcome took material form in abundant provisioning. A bullock, with yams, bananas, and not less than six gallons of new milk, afforded a feast to which the travellers sat down in great contentment, on the slope of a "gentle and fertile hill" at the base of which flowed a stream of milk-white water.

The Falatahs, with their hair plaited in elaborate fashion, received the white men (the first they had seen) with respectful courtesy, and in fact kindness was the rule throughout this part of the journey.

At the great city of Katunga the Landers were received by the king in his robes of state: a headpiece like a mitre, ornamented with strings of coral; a robe of green silk, crimson silk damask, and green silk velvet, all sewn together like patchwork; English cotton hose, and leathern sandals of native make. A "large piece of superfine blue cloth" given to him by Clapperton, served as a carpet, and surrounded by those

"huge hills of flesh," his eunuchs, he presented a most imposing appearance.

Over a road through a rich country, where deer, antelopes, lions, leopards, elephants, and wild asses abounded, the travellers arrived at Kiama. Richard was greeted with enthusiasm by the king, whom he had seen on his earlier journey, and who promptly arranged a horse race for his guests' entertainment. They found the strange, far-wandering Falatahs dispersed all over the Borgoo states, but could learn nothing of their origin.

At Boussà, after a formal reception by the king and queen, they eagerly visited the Niger, at this place not more than a stone's-throw wide, and saw the place where Park perished in attempting to explore it. The brothers moralized upon the number of valuable lives which had been lost in the same cause, and prayed that they might be the "humble means of setting at rest forever the great question of its course and termination." Travelling on its surface they journeyed to Yaoorie in canoes, and paid a visit to the Sultan, from whom they concealed their real object. They found Yaoorie a city of immense extent and said to be as populous as any in the whole continent. There were many industries, and the markets were large and prosperous. Delayed by the Sultan for some time, the explorers visited Guàda, and then returned to the Niger and canoes. They passed vast fields of corn under cultivation, and arrived at the celebrated market town of Warree.

Near Garnicassa several rivers joined the Niger to form a magnificent stream seven or eight miles in width, and caused the brothers much wonder as to what became of such a quantity of water when five miles below the Great River was shallow and but a stone's-throw across. It was believed by some of the natives that a large part went by a subterraneous passage to a few miles below Boussà, but "no two opinions agreed as to the source, course, and termination" of this wonderful stream.

On the Landers' return to Boussà they were welcomed with enthusiasm by the king and queen, and the former paid a visit to the "black water" (Niger) to ask if it would grant the Englishmen a passage down its current, when, as the river "promised to conduct [them] in safety," he placed a large canoe at their service. After repeated thanks to the king and queen for their sincerity, hospitality, and uniform kindness, the brothers took their leave regretfully.

The Niger's course was now much interrupted by islands, which, like the banks, were very beautiful and fertile. Mighty trees, "elegant" shrubs, and festoons of creeping plants framed their waterpath, but not a flower was to be seen! They were surrounded one night by an incredible number of hippopotami, which, "splashing, snorting, and ploughing all around the canoe," placed them in great danger. Cities, market towns, and villages without number, passed in review, and many of the natives, though civil and attentive for the most part, stood rather in

fear of the white strangers. At Egga the chief told the Landers that they were "strange-looking people and well worth seeing," and his tribesmen flocked by the hundreds to satisfy their curiosity with a sight of the visitors. Presents of goora nuts, cocoanuts, yams, country beer, rice, etc., were laid at their feet, and information as to the temper of the tribes below along the river were offered for their guidance. At a point near Kirree a party of travelling blacks in a war canoe fell upon the Landers and succeeded in overwhelming them. Most of their effects were spilled in the river, and great damage was done to their notes. A council of war was held at Kirree, and the inhabitants insisted on having the "barbarians" punished who had violated the "white man's peace."

Further down the river the explorers, now both ill with fever, were held for ransom by the king of Eboe. Ransomed by another king they reached the sea without further misadventure, and took passage in a vessel bound for Rio Janeiro, whence they made their way back to England.

The second expedition of the Landers, in 1832, which started with the intention of ascending the Kawara to Timbuktu, reached only as far as Rabba, and was generally unsuccessful and disastrous;—as was also the "Great Niger Expedition," sent out under Captain Trotter by the British Government at about the same time for the same field.

CHAPTER XVIII.

MID-CENTURY EXPLORATION IN AFRICA.

Section 1. On the 1st of June, 1831, an expedition commanded by Major José Correia Monteiro set out from Tete to follow up the Portuguese explorations which had been done by Dr. Lacerda on the west coast in the previous century. Accompanied by Captain Antonio Garnitto and about four hundred and twenty blacks, Monteiro made his way as far as the Kraal of Cazembe, but beyond that place the difficulties encountered were so terrible that, after sending a letter to the governor of Angola by some of the black traders of their party, the expedition turned back. The letter, which was dated 10th of March, 1832, was delivered on the 25th of April, 1839. It was the black men and not the Europeans who traversed the continent on this occasion. But Monteiro was more fortunate than his predecessor, for he was enabled to complete a map of the country he visited, and to bring back a complete account of the journey as far as it went.

The daring Hungarian traveller, Ladislaus Magyar, by a series of journeys into the interior during the years 1849 to 1856, nearly completed our knowl-

edge of the district between the most northern point reached by Anderson and the route afterwards taken by Livingstone from the valley of the Upper Zambesi, to the west coast. Just when Magyar first visited Africa is not known. By his own story he went to the Portuguese settlements of the western coast about 1847, marched from Ambriz across the country to the Congo, and, after passing "beyond the cataracts which had stopped all previous explorers, traversed much of the region south of the river."

As early as 1847 he was in Benguela, the most southern Portuguese province on the coast, and in 1849 he accompanied a native caravan to the inland kingdom of Bihé. The route lay along the verge of precipitous abysses at the bottom of which they could see the bleached bones of earlier travellers. "Now and then, among the lowering hills above them, they saw the forms of the wild predatory tribes of the hills, apparently mustering their forces, and deliberating whether an attack might be ventured." As they advanced into the interior, the rainy season came on, and on reaching Kissangi-land they were obliged to erect temporary huts every evening for protection. Persevering, they proceeded through the valley of the Kubale river, over the lofty table-land leading to the Lingi-Lingi Mountains, and at last reached the extensive plateau of Sambos, which is about six thousand feet above sea-level.

At Bihé Magyar was cordially welcomed by the black king, who a few days later offered him his

daughter as a wife. Realizing that such an alliance would give him influence, the explorer accepted the dusky lady, and was soon established in all the dignities of an African prince. Determined, however, to carry out his intention of penetrating the country farther, he set forth accompanied by his wife on an eastward march towards the Coanza river (1850). After crossing the hilly country of Kimbandi, they passed through the great Obowihendi forests (a dividing belt between the western and central regions of Africa), and met with the Mu-Kankala,—a strange race of beings "not more than four feet in height, of a rusty yellow colour, and with features which seem a caricature of the human face."

Leaving these dwarfs, they traversed the land of the Chibogue,—a people who afterwards caused Livingstone much trouble,—and entered the kingdom of Moluwa, which seems to be identical with that of Cazembe, and which Magyar regarded as the most powerful in Central Africa. Magyar remained for over a year among the friendly Moluwa people, and, in spite of their extreme superstition, considered them superior in intellect to all other native African tribes.

Setting out upon his return to Bihé in 1851, he chose a southern route, passed through the district called Lobal, and, though not aware of the fact, crossed the upper end of the Zambesi valley. He even traversed a small portion of the path later taken by Livingstone,—"skirting Lake Dilolo, and, like the

latter traveller, leading his caravan through the marshes which surround it." In these marshes he found many great snakes, which, killed, roasted, and eaten fresh, were esteemed a great delicacy by his followers.

During the year after his return from the Moluwa kingdom, Magyar made a journey to the land of the Kilengues,—lying farther to the south than he had yet ventured,—and in 1853 reached the Kunene river, so perseveringly sought by Anderson and Green. Returning through a desolate country he claimed the discovery of the source of the river in Galengue plain between two and three degrees south of the Equator.

He again penetrated the forests of Obowihendi and reached the country of Lobal in 1855. But in 1857 his career of prosperity was suddenly terminated by the murder of his father-in-law, the king, and he was compelled to return to Dombe Grande, a town in Benguela, where he died in extreme poverty in 1864. Magyar's journal of his travels from 1849 to 1856 was sent to Pesth, where the first volume was published in 1859 at the expense of the Hungarian Academy.

Among the most distinguished of east African explorers, Dr. Charles Tilstone Beke figured very conspicuously. This great traveller made his first advance into Abyssinia in 1840, and devoted three years to the study of its geography, peoples, climate, products, etc., with the ever-present idea of opening

the country to trade with Great Britain. "His journey resulted in making known the true physical structure of Abyssinia and of eastern Africa generally, showing that the principal mountain system of Africa extends north and south on the eastern side of the continent, and that the Mountains of the Moon of Ptolemy are merely a portion of the meridional range. Dr. Beke was the first to ascertain the remarkable depression of the salt lake, Assal. He fixed, by astronomical observation, the latitude of more than seventy stations, and mapped upwards of seventy thousand square miles of country. He visited and mapped the watershed between the Nile and the Hawash, along a line of fifty miles northward of Ankober, and he discovered the existence of the river Gojeb. He constructed a very valuable map of Gojam and Damot, and determined approximately the course of the Abai."

At the time of Dr. Beke's pioneer visit, Abyssinia was "one of the most ancient, most renowned, most remarkable, and yet least known of kingdoms."

He writes: "On my way to and from that country, I crossed the eastern edge of the high table-land of eastern Africa at points . . . . more than four hundred miles distant from each other, and, in 1842, I explored, in company with Rev. Dr. Krapf, a district of nearly one degree in latitude along the edge of the table-land, on which occasion I determined the water-parting in that direction between the Pacific and Atlantic Oceans." (The waters of one side flowing

into the Indian Ocean and the other into the Nile.) Dr. Beke received the gold medals of the Royal Geographical Society of London, and of the similar Paris institution.

Section 2. At the end of April, 1841, Major W. Cornwallis Harris, selected by the British Government to conduct the mission to the King of Shoa in South Abyssinia, left Bombay under instructions of the government of India for Tajera on the East African coast, from which the objective capital was supposed to lie four hundred miles inland. Besides Major Harris, the embassy included Captain Douglas Graham, Assistant Surgeon Kirk, Dr. Roth as naturalist, the Reverend Dr. Krapf, who visited the heathen in the cause of Christianity, and the efficient geographer M'Queen, with volunteer and other soldiers and natives. Tajera, the great trading seaport, made a most interesting starting point for a journey which was to taste in its course both suffering and success.

The difficulty in obtaining water, which afterwards menaced the lives of the whole party, began almost at the outset, and at Ambabo the waterbags were filled, preparatory to the crossing of the dreary Odel desert. The march led over a level table-land, its "barren surface strewn with shining lava and bleached animal bones; [and] sickly acacias of most puny growth, sparingly invested with sunburnt leaves, here and there struggling through the fissures as if to prove the utter sterility of the soil; whilst total absence of

water, and towering whirlwinds of dust, sand, and pebbles, raised by the furnace-like puffs that came stealing over the desert landscape, completed the discomfiture of man and beast." The sufferings from thirst, already almost unbearable, were emphasized by the arrival at Bahr Assal, a great salt lake, surrounded by a field of salt and a weird scene of "unkempt desolation."

Goongoonteh, however, brought a great measure of relief in a rivulet of water and a chance to rest. In the short journey across the dire Tehama from Tajera, fifty pounds of well-packed spermaceti candles had so melted out of their box that a mere bundle of wicks remained. At Suggadéra, where dwarf palms and tamarisks relieved the monotony of the level, dwelt a pastoral race among their goats, sheep, and camels, with an income increased by the salt trade.

The next stage of the journey brought the expedition to the foothills of a lofty range behind which the river Hawash was "lost in the great lake at Aussa." Observing a gradual improvement in the aspect of the waste, the company proceeded over the high table-land of Hood Ali, and thence to Dullool, (1228 feet above the sea level) a perfect flat, bounded by a bold mountain range, and inhabited by ostriches and antelopes.

At Oomergooloof, though Harris noted an extraordinary mirage, they learned that no water could be found at any season, and most of the way a tree was

a rare phenomenon. The expedition, approaching Wóema, encamped in the territory of the Danákil tribe, the members of which were one and all so given to thievery, that a constant watch was maintained in their presence. Near Killulloo Harris examined some of the many extinct volcanoes, a very large one of which, Mount Abida, was learned to be three thousand feet above sea level, while the crater of Aiülloo rose even higher. Hazed in the extreme distance rose the "great blue Abyssinian range" towards which the caravan was directed; but at Burdadda the peaks became quite clear to the travellers' eager vision. Working their way towards the Hawash, their attention was frequently held by the myrrh-bearing tree, the Kurbeta, in the precious sap of which the natives traded extensively.

The great Hawash, the second of the rivers of Abyssinia, rises in the heart of Æthiopia at eight thousand feet above the sea, which it never reaches. "It is fed at long intervals by small tributaries from the mountains of Shoa and Efat, and flows like a great artery through the arid plains of the Adaïel, and is finally absorbed in the lagoons at Aussa." Most of its shore line is marked by luxuriant vegetation, however bare the surrounding country may be, and its waters are the home of innumerable hippopotami, whose presence increased the difficulty experienced by the caravan in crossing. Le Ado ("white water") they found to be an extensive lake, rich in lotos flowers and aquatic birds (geese, mallard, teal,

herons, and flamingoes), and a favorite bathing place of elephants. There white faces were strange to the sight of the natives, who crowded curiously about.

"Rising tier above tier to the supremely soaring head of Mamrat . . . . ever canopied in clouds, the lofty mountains which fortify the royal dominions now shot like giant castles from the sandy plain."

In the valley of Kokaï, the principal mountain pass, the "first crystal brook" of the journey greeted the travellers and renewed their strength.

The advance of the embassy to Farri was interrupted by a functionary of the king's, so a camp was made on the plain of Dinomali. A message from the court, however, brought a royal command in their behalf, and at the frontier station of Argobba the usual import duties of ten per cent. were omitted, and presents from the king of oxen, sheep, bread, beer, and hydromel were delivered to them. With an escort of three hundred matchlockmen of the king's guard, the expedition proceeded to Farri, where "clusters of conical-roofed houses, covering the sloping sides of twin hills . . . . [were] welcome signs of transition from depopulated wastes to the abodes of man."

At Alio Amba they were again delayed, and here they gave their attention to the customs and markets of the natives. Honey, cotton, grain, etc., beads, metals, coloured thread, glass, ostrich feathers, cloth, coffee, horses and mules, were displayed in more or

less tempting array, and the clamour of the bargaining rose loud upon the ears of the outsiders.

At last the royal orders urged the embassy to Shoa, and they made their way to that elevated table-land over a road rich with corn, red and white clover, brooks, endless hedgerows of flowers, dog-roses, and jessamine, the fragrance and colour of which made that march the pleasantest of the expedition. The stockaded palace at Machal-wans, with its conical white roofs, surrounded by a fair grove of juniper and cypress, and sentinelled by a tremendous mountain, a guard of which slept in the background, was a sight well worth the journey. Received after repeated delays by the luxurious ruler of their quest, who donned his robes of state in their honour, the ambassadors (in full dress uniform) completely won his heart by the gorgeousness of their presents to him,—presents which had been chosen in India with a remarkable fore-knowledge of the native taste. He had no words to express his entire satisfaction, and most gladly signed the treaty which was to open Abyssinia to the traders of a country whence had come so much magnificence. A successful elephant hunt so added to the personal honour of Harris and his companions that they were treated with regal pomp,—and their accomplishments became the subject of national rejoicing, when their merits were sung into renown by the throng of natives who escorted the conquerors back to the king.

After many excursions into the surrounding coun-

try, exploration of lakes and volcanoes, and valuable folk study, Harris and his party returned to receive the merited applause of their country.

Messieurs Ferret and Galinier, two officers of engineers, were employed by the French Government to survey North Abyssinia from Hamazen to Gondar in 1840-41. Only the most meagre and unsatisfactory accounts are to be obtained of their expedition, which was to have reported especially concerning the Tigré, and the general conclusion seems to be that little was accomplished by their efforts.

Section 3. Lord Palmerston, in 1849, sent out a "mixed scientific and commercial" expedition to the Soudan, which was headed by Mr. Richardson, and accompanied by two "scientific Germans,"—Doctors Henry Barth and Overweg. Richardson soon and Overweg later succumbed to the climate, but Dr. Barth survived five years' exploration of "those pestilential regions," and returned to civilization in safety, rich with exact information concerning the country visited. His journeys covered the vast area between Tripoli and the Pagan kingdom of Baghirmi, 1500 miles by 800, from the eastern shores of Lake Tchad to the mysterious city of Timbuktu. He mapped correctly the great water system of which Lake Tchad is the reservoir, and traced the Bénuwé to its marriage with the Niger.

He says, "Our [expedition] would never have been able to achieve what it did, if Oudney, Denham, and Clapperton had not gone before us; nor would

these travellers have succeeded so far, had Lyon and Ritchie not opened the road to Fezzan, nor would Lyon have been able to reach Tejerri, if Captain (Rear-Admiral) Smith had not shown the way to Ghirga . . . .

"Extending over a tract of 24° from North to South, and 20° from East to West, in the broadest part of the continent of Africa, my travels necessarily comprise subjects of great interest and diversity.

"After having traversed vast deserts of the most barren soil, and scenes of frightful desolation, I met with fertile lands irrigated by large navigable rivers and extensive central lakes, ornamented with the finest timber, and producing various species of grain, rice, sesamum, groundnuts in unlimited abundance, the sugar cane, etc., together with cotton and indigo, the most valuable commodities of trade.

"The whole of Central Africa, from Bagírmi to the East, as far as Timbuktu to the west, ... abounds in these products.

"The natives of these regions not only weave their own cotton, but dye their home-made shirts with their own indigo.

"The river, the far-famed Niger, which gives access to these regions by means of its eastern branch, the Bénuwé, which I discovered, affords an uninterrupted navigable sheet of water for more than six hundred miles into the very heart of the country. Its western branch is obstructed by rapids at the distance of about three hundred and fifty miles from

the coast; but even at that point, it is probably not impassable in the present state of navigation, while, higher up, the river opens an immense high road for nearly one thousand miles into the very heart of western Africa, so rich in every kind of produce.

"We found here commerce in every direction radiating from Kanó, the great emporium of Central Africa, and spreading the manufactures of that industrious region over the whole of western Africa."

By way of Múryuk the expedition reached Ghât, and there realized that they were "about to enter upon a region totally unknown, of which no authentic accounts from eye-witnesses . . . . had ever reached [them]; valleys unexplored, deserts unconfronted; countries which no European had ever surveyed." Leaving Maránaba, the "half-way" town between Ghât and Aïr, Barth was obliged to compromise with a "wild and lawless set" of borderers of Aheer,—a spontaneous gathering of all the blackguards of the country,—and to pay large tribute for freedom and "protection."

"One of the most interesting phenomena" witnessed during the expedition was a characteristic desert "flood"—a river of water where had been a dry valley but a few hours before. The valley of Tintellust brought the travellers to the residence of the old chief A'nnur, who observed that "even if, as Christians, [they] had come to his country stained with guilt, the many dangers and difficulties [they] had gone through would have sufficed to wash [them]

clean, and that [they] had nothing now to fear but the climate and the thieves." Barth writes of him, "I cannot withhold from him my esteem both as a great politician in his curious little empire, and as a man remarkable for singleness of word and purpose."

A'gades he considered a comparatively healthful and convenient place from which to open trade relations with Central Africa.

Camping on the last day of 1850 the company experienced no little difficulty in finding a sufficient space free from the feathery bristles of *Pennisetum distichum,* but found consolation in an extra dish of two ostrich eggs. At Tagelel they reached the point where travellers were able to proceed singly with safety, and there Overweg and Barth parted from Richardson, because of financial depression, to try their independent fortunes till new supplies should arrive from "home."

Barth at first had difficulty in tolerating sorghum as food, but later learned to like some preparations of it and to consider it the most suitable food for a hot climate.

Under the protection of the Sultan of A'gades and other rulers, Dr. Barth journeyed to A'yads, a "considerable town, said to have been once as large as Tunis, situated in the midst of lawless tribes, on the border of the desert and of the fertile tracts of an almost unknown continent, established there from ancient times, and protected as a place of rendezvous and commerce between nations of the most different

character and having the most various wants." Dr. Barth then departed for Soudan,—alone as far as white company was concerned. Near Chirák Dr. Overweg, planning to make an excursion to Góber and Marádi, took leave of Dr. Barth, and accompanied only by a Tábu servant started for Tasáwa. He was in excellent health and spirits, and filled with enthusiasm.

Kanó had been one of the great objects of the journey as the point whence the still more difficult and distant regions might be most successfully attempted. Dr. Barth reached it after nearly a year's exertions. A population of 30,000 was occupied in the manufacture of cotton cloths, and in the Kola-nut and slave trades.

Bórnu was reached via Geyáwa, Daká, and Gerki, Dr. Barth travelling part of the time quite alone without even a servant, and, though ill for several days, never for a moment despairing. Soon after passing Zurrikulo he learned of Richardson's death, and near Bandigo visited the latter's grave at Nghurútuwa.

On the first of April, Barth camped near Kúkawa —"the capital of the populous and rich Empire of Bornu." He approached the residence of the chief, whom the mission was especially ordered to salute, in a poor plight, and thrown entirely upon his own resources by the director's death. He had been greatly hampered all the way by lack of means.

From Kúkawa he made excursions towards Lake Tchad, the second one carrying him as far as Ngúl-

heá. He found the great lake a fine, open sheet of water with no visible outlet, surrounded by a forest of reeds, and covered with water plants. "Numberless flocks of water fowl of every description played about," and many antelopes of a variety peculiar to the region made the lake their drinking place, as did also the elephant herds to the north. Barth then rode to Maduwári, where Overweg's death a year and a half later added one more victim to the cause of exploration. From Káwa, Barth sent his faithful Muryuk servant, Mohammed el Gatroni, by caravan to Fezzan with Mr. Richardson's effects and journal, and letters to the British Government introducing himself, and asking for instructions. He was authorized to carry out the expedition just as it had been planned, and was provided with means for the enterprise.

Overweg arrived in Kúkawa very ill. When he was able to proceed he and Barth started for Adamáwa, whose capital, Yóla, is situated on a tributary of the Niger. Barth visited the confluence of the Bénuwé and Fáro to decide for himself with regard to the direction and tributaries of the great southern river. Dr. Overweg returned from Pintwa to navigate the Lagoon in his English boat. Two detached mountains which they saw were called Alantika and Taife.

While waiting for canoes, Dr. Barth took a bath in the "great eastern branch of the Niger," and the natives shouted that he was searching for gold, which they thus submitted was to be found there.

At Yóla,—a large open place of conical huts surrounded by courtyards,—he was turned back by the governor, and, though ill, obliged to leave the town because of having come through an enemy's country, and of having no letters from the British Government. He returned to Kúkawa much reduced by fever.

Overweg, meanwhile, had returned to Maduwári from " his interesting voyage on the Tchad, of which everyone will deeply regret that he himself was not able to give a full account."

He now joined Barth on his adventurous expedition to the northeast, the latter fighting off an attack of fever all the way. Nearing the lake one day for water the party saw a herd of ninety-six elephants arranged in regular array with the males in front, then the young, then the females, and five large bull elephants as a rear guard,—" One of the most interesting scenes which these regions can possibly afford!" Later they killed a snake measuring eighteen and a half feet in length, which two natives immediately cut open for the sake of the fat, declaring it excellent. The company returned from Kánem, because of hostilities between the natives and freebooters, leaving the eastern shore of the lake unexplored. From Kúkawa Barth joined a warlike expedition under the Sheikh and his vizier, arguing and advising against the slave-trade. They marched towards the Músgu country attended by eight female slaves—the vizier's war-harem! (This gentleman was quite outdone, however, by the King of Bagírmi,

who was seen on an expedition with forty-five mounted female partners *en train!*) Passing many strange and barbarous tribes the party reached Kákalá, the vizier's army having taken three thousand slaves. Barth gained an exact knowledge of the richly-watered equatorial zone, which had been supposed to offer insurmountable barriers to exploration in a high mountain chain and in savage tribes but little removed from wild beasts.

The company returned to the "town" (Kúkawa) on the 1st of February, 1852, and a month later Barth set out for Bagírmi, accompanied as far as Ngórnu by Overweg, who there set out along the shores of the lake towards Máduwári on his last expedition.

Ngola, Afades, Kála, and Logón (or Kárnak) were visited by the indefatigable Barth successively, who left the latter place to penetrate into entirely unknown regions never before trodden by European foot. He gladly noted shallow watercourses as one of the most characteristic features of the Central African landscape, which was thought to be a dry, elevated waste. Dense jungle and great numbers of wild animals were encountered east of the Shuwa villages, and there Barth first saw footprints of a rhinoceros—"unheard of in the western parts of Negroland." What was his astonishment to behold wild hogs standing knee deep in the same pool with native boys in bathing, and the same ferocious animals browsing among the tame cattle of the villagers.

At the town of Bágomán he stood on the banks of

the great river of Bagírmi,—the Shari,—and there experienced at midday a temperature of 110°. He was turned back by the native authorities, and went to Bákadá to await the Sultan's permission to enter the country. He wrote that there "could not be the least doubt that the greater part of the inhabitants were unfavourably inclined toward the stranger."

After waiting a long time he started back intending to retrace his steps, but missed the route and found himself at Kókoroché.

On the way to Mélé, to which he was directed by the natives, he was astonished to see quantities of dum-bushes and dum-palms; which he had believed to belong only to Upper Egypt. He reached the "inauspicious village" where he had first set foot in the country, only to be seized and put in irons; where he remained till a friend from Bákadá,—H'aj BuBakr Sadik,—came to his rescue and conducted him to the capital Más-eñá.

Receiving dispatches from England with new authority, means, etc., he was able at last to meet the Sultan and his court with vested and sustained dignity, and spent some time studying the habits and customs of the tribes thereabouts. At Kúkawa he was rejoined by Overweg, and together they achieved a treaty with the Sultan, opening the country to trade with Great Britain. Overweg, greatly reduced and weakened, struggled to the lake and back seeking change of air, and then returned to Máduwári to die. Barth, though saddened by the loss of his companion,

was still energetic and sanguine, and soon started for Timbuktu and the countries on the Niger. He left Kúkawa on the 25th of November, 1852, with the immediate definite object of reaching the Niger at the town of Súy. He experienced the coldest night of his whole journey on the way,—9° above the freezing point.

Passing through the districts of Rédani, Kangalla, and Meggi, he observed many wells from twenty to twenty-five fathoms deep, and experienced a plague of ants threatening the demolition of his luggage. He approached the Komeduga of Bornu through a district of richest vegetation, and enjoyed "one of the greatest delicacies of the traveller in these regions"—the flesh of the guinea fowl. At the site of the ancient capital of the Bornu Empire, built at the end of the fifteenth century, he found a once strongly walled but now sadly dilapidated structure of sunbaked bricks in a regular oval six English miles in circumference.

Across a great stretch of open country the explorer (leaving the town of Nghurutuwa where Richardson died). reached the province of Manga, beyond which the way looked dreary and uninviting but gradually led to a fertile region of tamarind trees and the Kuka or monkey bread trees. An open sheet of water called Thaba-Kenáma was so filled with fish that the natives had developed an important industry by drying, pounding, and making them into balls, which they extensively exported. Leaving the decayed town

of Géshiya, Barth frightened away a band of thieves by the novel method of playing on an accordion. He proceeded in a northwesterly direction towards Zurrikulo, "the queen of the region of dum-palms," passing a comfortable, populous place called Kechiduniya —"the sweetness of the world"—where a market offered for sale groundnuts, sour milk, grain, earthen pots, sheep and young cattle.

Having mapped a hilly country of "triangular form in the very heart of Negroland," Barth now passed through the valley of Tongure, with its date palms, cotton, and mimosas, to the Gure capital, where he was received by the governor,—"powerful, respectable and princely,"—with the usual exchange of presents. On the march to Zinder—the "gate of the Soudan"—he visited Mushek, Magajari, and a natron lake one and a half miles in circumference. At the great caravan centre (Zinder) he renewed his supplies and set out for the west. The whole region was overrun by parties of Asbenawa salt traders who "greatly contributed to the animated character of the landscape, but by no means added to the security of the country."

On this stage of the journey the first district passed through was densely inhabited but scantily timbered; the second covered with thick groves of dum-palms and fine old tamarind trees; and the third an unsafe wilderness between the independent Hausa states and the Fulbe country. At Katsena, Barth made presents to the governor and purchases to the amount of

1,308,000 shells in silks, etc.,—shells being the standard in currency.

With Wurno as his headquarters, Barth visited the country in all directions, making the excursion to Sokoto over extensive rice fields, and the march to Daghel and Gidanmanomi over the path used by Clapperton on his second journey. He found Clapperton had been very accurate as to direction and distances.

Leaving Wurno and passing Sokoto, Barth entered almost unknown regions on his way to Timbuktu. He visited the town of Gando, passed through the province of Kebbi, approaching the Niger by way of the town of Say, and crossed "this celebrated stream the exploration of which had cost the sacrifice of so many noble lives" in large canoes,—the "first Christian to visit Say." The southwestern side of the Niger being totally unexplored, Barth with great interest passed through the hilly country of Gurma, crossed the river Sirha, and reached Sebba, the capital of Yagha ("of the wilderness"), crossed the river Yali, arrived at the village of Nomantugu, and in turn at the wealthy city of Dore, the village of Danande, the town of Aribinda, and the villages of Filiyo and Tinge. After a considerable delay caused by the rains, the traveller proceeded, visiting the city of Bone; an encampment of the Tuarek—"the robbers of the desert"—with its leather tents, mosquitoes, and hyena camp followers; the town of Bambara, where the doctor pretended to be a Mohammedan; the

town of Sarayamo; by water the town of Kabara (Timbuktu's harbour); and by land reached at last the great and populous city of Timbuktu, the object of his most arduous undertaking. Christians not being welcome, Barth kept to the house assigned to him when his real character was discovered, and the confinement encouraged an attack of fever. Recovering, however, he had the gratification of hearing news and praises of his predecessor Laing. How, after having been plundered and almost killed by the Tuarek, he was assisted to the camp of the Sheik's father (half a day's journey from the well of Bel Mehan, and at present deserted), where his "great bodily strength and noble and chivalrous character" met with the utmost respect.

Barth noted that Timbuktu's market traded extensively in manufactured leather work, kola-nuts, rice, corn, vegetable butter, pepper and ginger, and a little in cotton; that salt was more valuable than gold; that silver was greatly in demand; and that gold was the chief staple. For the short distance he was able to penetrate beyond Timbuktu, he observed that the vegetation was very rich. Bose-bango was as far as the natives allowed him to venture. His final departure from Timbuktu took place on the 17th of May, 1854.

He reached London on the 6th of September, and to the astonishment and gratification of the entire civilized world "made known the whole of that vast region, which even to Arab merchants in general had

remained more unknown than any other part of Africa." After frightful dangers, pecuniary embarrassments, illness, and hostile intrigue: Success!

In the latter part of 1853, the British Government sent out Dr. Vogel, a young German naturalist and astronomer, to strengthen Barth's expedition, and to follow up the latter's discoveries.

Well equipped with instruments and provisions, Vogel landed at Tripoli, and by following the regular caravan route, made his way to Kúkawa in Bornu, on the 13th of January, 1854. At Kúkawa he met and consulted Barth, and then proceeded at once to the task of extending and elaborating the work already done. After thoroughly scouring all the provinces in the immediate vicinity of Kúkawa (or Kouka), he advanced in a southwesterly direction to the Benué river, which Barth had visited at a point four hundred and fifteen miles east of its conjunction with the Niger. Thence he turned eastwards in the direction of the Nile, "hoping to bridge over the gap between the discoveries of the heroes of North Western and North Eastern travel,"—but on reaching Wara, the capital of Waday on the northeast of Darfur, he was put to death by order of the Sheikh of that district.

Dr. William Balfour Baikie was appointed in 1854 to the position of surgeon and naturalist to an expedition sent out by the British Government for the purpose of opening up the Niger to further trade with England. On the death of its leader at Fernando

Po, Dr. Baikie assumed command, and in a little vessel called the Pleiad sailed up the lower Niger to its conjunction with the Benué, and then ascended the latter river to a point about two hundred and fifty miles beyond that reached by any previous traveller.

His enterprise and successful administration on this occasion led the Government to give him command of a second expedition, in 1857. On this journey, however, the Pleiad was wrecked, and Dr. Baikie was deserted by his faint-hearted companions. Sanguine and undaunted, he took up the work alone; and at Lokoja at the confluence of the Niger and the Benué, he founded a trading station which may be regarded as the first serious attempt at civilization in the Niger region. Lokoja quickly became the rendezvous of most of the neighbouring tribes, and Dr. Baikie, for several years personally superintending the station as British consul, so completely won the confidence of this "motley crowd of barbarians and savages" that within five years English trading vessels had ventured up to the settlement, and were engaged in a secure and profitable trade with the natives.

During his stay at this post, Dr. Baikie collected the vocabularies of fifty dialects spoken in the settlement, and translated parts of the Bible and Prayer Book into the Hausa language. In 1863 he started for home, but died on the way and was buried at Sierra Leone.

CHAPTER XIX.

SEEKING THE SOURCES OF THE NILE.

Section 1. All the early Abyssinian travellers had traversed the Daukali country and that of the northern tribes; but the land of the Gomal had never been visited, and Harar was an unknown wonder.

"The ancient metropolis of a once mighty race; the only permanent settlement in Eastern Africa, the reported seat of Moslem learning, a walled city of stone houses, possessing its independent chief, its peculiar population, its unknown language, and its own coinage, the emporium of the coffee trade, the headquarters of slavery, the birthplace of the Kat plant, and the great manufactory of cotton cloths, it appeared, deserved the trouble of exploration,"—Harar, the counterpart of the far-famed Timbuktu.

Sir Richard Francis Burton, one of the most daring and successful of modern travellers, disguised himself as an Arab merchant, and prepared to visit this forbidden city. He left Aden in October, 1854; arrived at the capital of ancient Hadiyah in January, 1855, after having penetrated "a vast and populous region scarcely known to geographers;" and

returned to Arabia and safety in February for stores for a second and longer journey which he planned but never carried out.

Somaliland, not only unknown, but enveloped in a mist of fable and strange report, seemed to offer to explorers all the possibilities which excite the enthusiasm of the venturous.

Captain John Hanning Speke, who volunteered to the British Government to try and reach the Wady Nogal, struggled over much new country, but failed in his object, owing to the bad conduct of his hired guide, and to the warlike temper of the tribes.

In 1856 began the memorable series of expeditions to the country of the upper Nile. Towards the end of that year Burton and Speke, who had been together at Berbera in 1855, started out to ascertain the truth of certain reports collected by missionaries of a vast sea lying in the heart of the continent. They left Zanzibar early in 1857, and made their transit of the Kingani and Mgeta rivers from Bomani. In great danger from the ignorance and superstition of the natives, all of Burton's rare diplomacy was needed to win permission to proceed,—and this while he was so ill as to be obliged to travel in a hammock.

Beyond the cultivated land their route plunged into jungle "where the European traveller realizes every preconceived idea of Africa's aspect, at once hideous and grotesque." The damp, heavy, odorous air teemed with the malarious exhalations of decaying vegetation and standing water. "Zungomere,

the head of the great river valley, is a plain of black earth and sand, prodigiously fertile," and the centre of traffic in Eastern Africa. The first, or maritime section, of their journey extended from the shores of the Indian Ocean to the mountain chain of the land of Usagara. Its undulations, everywhere covered with abundant and luxuriant vegetation, presented "no eminences worthy of notice." In the many clearings, tobacco, maize, groundnuts, beans, pulse, sweet-potatoes, etc., flourish lavishly. The pineapple was a weed! Mangoes, pawpaws, plantains, limes, etc., throve throughout the near-sea districts, and rice grew abundantly over the lower levels.

In August the expedition left Zungomere, and pushed forward to the Usagara Mountains, with both Burton and Speke enfeebled by malarial fever, till the "wondrous change of climate at Mzizi Mdogo," on the frontier of the second region, the "land of the Delectable Mountains," restored their strength. Pushing on with new energy, they marched among the noble tamarinds which lent their name to the district. At this period of their journey, Burton noted "a curious contrast in this strange African nature, which [is] ever in extremes, and where extremes ever meet, where grace and beauty are seldom seen without a sudden change to a hideous grotesqueness," where a splendid view of the open country which charmed him in the morning was replaced at noon by the rank growth of a jungle—"a tangled mass of tall fetid reeds" and forest with decaying tree trunks en-

croaching upon the path. Towards the Myomho river the expedition was visited by a plague of ants, and suffered greatly from the tzetze fly (the scourge of a country otherwise perfect for farming); and many deaths occurred among both the men and the asses.

With great labour they surmounted the "Pass Terrible," and later the "Windy Pass," summit of the third and westernmost range of the Usagara Mountains, the main watershed of the region, with an elevation of 5700 feet above the sea. The Ugogo plains were found to be a high tableland, comprising the second or mountainous region. Usagara was peculiarly the land of jungle flowers and fruits. The delicious fragrance of the jasmine flowers, and the soft perfume of the mimosa, mingled with the clean odour of a kind of sage.

In September, having passed over several desert places, the caravan arrived at the Ziwa (a pond), three thousand one hundred feet above the sea level, and the drinking place of big game such as elephants, giraffes, and zebras. Their path invaded the haunts of lions, leopards, rhinoceri, wild cattle, gnus, quaggas, ostriches, and antelopes, which afforded exciting sport to the hunters of the party. With much difficulty and more illness the expedition proceeded day by day, submitting perforce to the outrageous extortions practised by the natives when selling supplies, while cold moons and burning suns added to their discomfort, and the ceaseless alternation of chok-

ing jungles and withering deserts kept reducing their numbers. Ugogo, the third region, rose gradually to a higher, cooler, and dryer altitude.

The rice, cotton, and tobacco, which flourished from the coast far inland, were supplanted by rugged sorghum and maize. The cultivation of these food grains was entirely in the hands of the women, the men reserving their strength for the emergencies of battle and the hunt. Entering Unyamwezi, the "Land of the Moon," so far-famed for its contrasts to the surrounding country, the expedition arrived at Kazeh on the 7th of November, 1857—the one hundred and thirty-fourth day from the coast. This was the capital of the Omani merchants. Cloth, slaves, ivory, food stuffs, and ornaments found here an active market. Unyanyembe, the central and principal province of Unyamwezi, had an almost wholly Arabian population. Emigrants from Oman, and their caravans, dissolving and forming, radiated about Kazeh like the spokes of a wheel. At this place, their departure being repeatedly deferred by the authorities, the expedition remained till the 14th of December, and then, released at last, moved onward toward Ujiji.

At Kajjanjevi, Burton was stricken with a peculiar paralysis, of which, though he shortly recovered sufficiently to proceed, the effects lasted over a year. While still almost helpless, he insisted upon resuming the journey, and started for Usagozi, in a hammock borne by six men.

The country thereabouts was in "alternate seams of grassy plains, dense jungle, and fertile field." And luxuriant crops of grain, vegetables, and tobacco were ripening on the cultivated lands. The caravan crossed the Malagarazi river in native canoes.

Unyamwezi with the Uvinza country constituted the fourth region of Burton's classification. It was a powerful realm, perched on a hilly tableland, but with no mountains. Burton called it the garden of central intertropical Africa.

Their route now lay through a desolated wilderness, once populous and fertile, but laid waste by war. Journeying for a short distance along the shore of the Malagarazi river, the expedition entered the district of Kinawani. Turning away from this river across rugged and rolling ground, intersected by deep morasses, they forded a tributary stream called Rusugi, and reached a settlement of the Wavinza engaged in digging and preparing salt for the market.

Over fatiguing inequalities and through difficult swamps the company advanced to the Ruguvu river, which they crossed by a temporary bridge of tree trunks.

On the 13th of February, 1858, Burton, who, though worn with toil, was indefatigable, ran ahead of the caravan to reprove a native guide;—and there before his eyes lay the reward of his labours, Lake Tanganyika in the lap of its mountains. "Forgetting toils, dangers, and doubtful of return, I felt willing to endure double what I had endured; and

all the party seemed to join with me in joy," ran the words of his note-book.

Important as was the position of Ukaranga, Burton found there, to his disappointment, only a few miserable grass huts. Travelling by boat on Lake Tanganyika to the "port town" of Kawele (a little village), they were greeted by swarms of blacks "whose eyes seemed about to start from their heads with surprise." This lake port was the scene of a well supplied bazaar or market,—the only relic of its one-time Arab civilization. Fresh fish, good honey, milk, butter, poultry and eggs, sheep, goats, etc., gave a needed variety to the table of the travellers. The fifth region, including the alluvial valley of the Malagarazi river (draining the Mountains of the Moon), with its rich loamy soil, which though desert in places was never sterile, terminated at Ujiji, the most productive province in this section of Africa.

The expedition succeeded in visiting many points on Tanganyika, but they were carefully kept away from the head of the lake by the natives, who protested against any exploration. There was much talk of the cannibal tribe at Murioumba.

Seeing the futility of attempting to prevail against the obstinacy of the blacks, Burton perforce abandoned his plan of visiting the upper end of the lake, and the whole company returned to Kawele in May, 1858.

On returning to Kazeh, Speke was despatched to

ascertain the truth of the natives' rumours as to a second great inland water;—and on the 30th of July, 1858, he had the glory of discovering the vast Victoria Nyanza. He rejoined Burton in triumph, convinced that he had discovered the mysterious source of the Nile.

The departure for Kazeh on the homeward journey took place on the 26th of September. At Hanga, Speke was seized with a strange attack of knife-like pains, accompanied by spasms, which almost cost him his life. Both he and Burton were obliged to travel in hammocks on the down trip. The 3rd of February, 1859, saw their arrival at the little seaside village of Konduchi. Leaving Zanzibar on the 22nd of March, and Aden on the 28th of April, the fortunate explorers returned to their native land.

In the same year, however, the indefatigable Speke returned again to the scene of his trials and his triumphs. He was accompanied this time by Captain Grant, and his large escort was made up of a small proportion of volunteers from the British army, and a number of native freedmen. It was Speke's belief that a large company would be necessary to prevent opposition from the semi-hostile tribes.

On the 24th of January, 1861, the expedition arrived at the old station of the previous trip, Kazeh in Unyamwezi, and thence travelled through Karagué and Uganda, to the Nile and the great lakes. Speke separated from Grant at Kuri, in order to increase

the ground covered, and to hasten to the head of navigation on the Nile, where he had arranged a rendezvous with Mr. Petherick. He passed through Ungoro and visited Madi. Fearing to be late he made all speed, arrived at the meeting place and came upon Sir Samuel Baker's expedition, on the 15th of February, 1863. As Baker was an old friend, Speke and Grant (who had rejoined his leader) remained his guests till the belated Mr. Petherick at last arrived, in the boat which was to carry the party down the Nile to Alexandria.

Speke had discovered also the affluent of the Victoria Nyanza,—the Alexandra Nile, "thus completing a great link in the chain of African discoveries which binds the country known from the east coast to that explored from the side of Egypt."

Section 2. In 1861, Sir Samuel White Baker resolved to attempt the solution of the great Nile problem, and if possible to meet and assist his friend Captain Speke.

Warned by the experience of his predecessors as to the dangers resulting from divided counsels, he determined to furnish an expedition entirely at his own expense, and to have as sole companion his wife,—a Hungarian lady whom he met and married at Cairo.

Leaving Cairo on the 15th of April, they sailed up the Nile to Korosko, crossed the Nubian Desert in the glare of a scorching sun, and reached Berber in the middle of the summer season with the thermometer at 114°.

By this time, Baker, realizing that his ignorance of Arabic left him at the mercy of the interpreters, "who have many opportunities of being dishonest, and seldom neglect these favours of fortune," resolved to devote a year to the study of the language, and to tracing the various Abyssinian affluents of the Nile.

Accordingly, after a week at Berber they set out on donkeys, accompanied by an escort of Turkish soldiers on dromedaries, across the desert, and in two days reached the junction of the Atbara and the Nile, —whence they proceeded to the village of Sofi on the former river. There they decided to remain during the rainy season. Baker built huts for the comfort of his followers, and beguiled the time for three months "potting hippopotami, knocking over crocodiles, stalking elephants, and not disdaining a shot at the pretty antelopes and stately giraffes."

At the end of the rains he determined to continue the exploration of the Abyssinian rivers, so, accompanied by a party of Hamran Arabs, celebrated as hunters, and by a German whom he met at Sofi, he and Lady Baker took their way to the Settite river. After carefully exploring this stream, they traced the Atbara to its source, then, proceeding due west, reached the Dinder near its confluence with the Blue Nile, and finally descended the latter to Khartoum, which they reached on the 11th of June, 1862.

At Khartoum, which, as Baker wrote later, he found "sacred to slavery and to every abomination

and villainy that a man can commit," he met with difficulties at every turn. All the officials and traders looked upon him as a spy sent by the British Government to suppress their profitable slave trade, who would bring to light their iniquitous dealings, enumerate the advocates of slavery, and put an end to it by European intervention. All the Turkish officers were anxious to prevent him from advancing southward. Despite this opposition, however, Baker managed to raise about ninety followers, of a somewhat dubious character.

On the 18th of December he set sail in three vessels, and proceeded up the Nile with his company to Gondokoro. The journey required six weeks, and was most wearisome, owing to adverse winds, and to the windings and fierce rapids of the river. Gondokoro, which was reached on the 2nd of February, proved to be a wretched place, a mere collection of grass huts, occupied only a small part of the year by traders on their return from raids into the interior. These traders also at once mistook Baker for a spy, and entered into a conspiracy against him, circulating damaging reports until his followers agreed to mutiny. The plot was revealed to Baker in time, however, and by the intercession of Lady Baker the difficulty was smoothed over, and the men returned to their duties. This was but a foretaste of future troubles.

On the 15th of February occurred the memorable meeting with Speke and Grant, fresh from their dis-

coveries. "When I first met them," wrote Baker, "they were walking along the bank of the river towards my boats. At a distance of about a hundred yards I recognized my old friend Speke, and with a heart beating with joy I took off my cap and gave a welcome hurrah . . . . . Speke appeared the more worn of the two; he was excessively lean, but in reality he was in good tough condition. He had walked the whole way from Zanzibar . . . . Grant was in honourable rags . . . . He was looking tired and feverish, but both men had a fire in the eye that showed the spirit that had led them through."

On first learning their conviction that they had discovered the source of the Nile, Baker feared that nothing remained for him but to turn back, and that "before the real work had begun."

But Speke exhibited a map of his route, and assured Baker that they had by no means completed the exploration of the Nile. It appeared that, though they had traced that river from the Victoria Nyanza to the Karuma Falls, when they crossed it, they did not meet it again till they arrived at 3° 32′ North latitude. They had been told by the natives of the district of Ungoro that the river flowed westward for a several days' journey from Karuma, and finally fell into a large lake called the Luta Nzige. Both Speke and Grant attached great importance to this statement, and were much chagrined that the fierce wars then being waged in the surrounding districts had made it impossible for them to verify the story.

Baker then decided to explore this lake of mystery, though doubtful as to the temper of his men, who still exhibited an unruly disposition.

Fighting against mutiny among his own men and conspiracy among strangers, not to mention the hardships of the rough country, he struggled towards Tarrangollé. Beyond Latomé the way led through one of the finest regions in Africa, and Baker pronounced the natives the handsomest people he had yet seen on that continent. Though warlike, they were frank, naïve, and polite. They went quite naked but wore elaborate head-dresses of their own hair done in strange shapes and ornamented with beads, cowries, and ostrich feathers. Baker found Tarrangollé to contain about three hundred houses.

By invitation he next visited Obbo, whose chief had sent him presents. He was very cordially received, but at this place both he and his wife were prostrated by fever, and so ill that neither could rise to nurse the other. The rainy season again set in, and it was not till the 5th of January, 1864, that they were able to start for the vicinity of that great unknown lake, the object of all their efforts. During their stay at Obbo, their last horse and all their asses had died, so they were obliged to supply their places with whatever pack animals could be obtained and to materially reduce their luggage.

Leaving Obbo, they crossed the river Asna, and reached Shoob to be again kindly received. Obliged by the desertion of porters still further to lighten

their equipment, they proceeded to the Karuma Falls of Speke and Grant's journey, where in order to overrule the natives' opposition to their crossing, Baker assumed the part of Speke's brother, saying that he had come to thank them for their kindness. Upon this he was welcomed with shouts of joy and wild dances. After some hesitation they were received by the king. Though both Baker and Lady Baker were still suffering from the effects of fever, they asked permission to proceed to the lake. This request was at last granted, and an escort provided of three hundred men with guides.

At the crossing of the Kafue river, Lady Baker was smitten with sunstroke, and fell from her horse insensible. Her husband was horror-stricken, and feared for her life. She was carried through an uninhabited stretch of jungle country till a more hospitable land was reached, where she suddenly recovered. They then resumed the march, and came to the village of Porkani. Gazing at a range of lofty mountains, Baker was told to his delight that they marked the boundary of the Nzige; and on the 14th of March, 1864, at a place called Vacovia, he looked down upon the magnificent lake which he named the Albert Nyanza. Weak though he was from his long fever, he was stimulated for the moment by the sight, and hastening to the white sandy beach "rushed into the lake, and, ... with a heart full of gratitude . . . . drank deeply of the sources of the Nile."

Having attained the real object of their long journey, their great desire was now to return home as speedily as possible.

Baker wished to sail down the Nile from the lake to the cataract in the Madi country. On their way down the Victoria Nile, they discovered a magnificent waterfall one hundred and twenty feet high, which Baker called the Murchison Falls, and of which he made a successful picture. At Patooam they learned that there was a war in progress just ahead of them. After two months' delay Baker was summoned to assist his friendly natives in resisting an attack from rival tribes and a gang of Turks. The attack was beaten off; but it was November before an escort could be spared for the homeward journey.

At Gondokoro they took a touching leave of their followers, whom they dismissed with suitable presents. At this point they had a great disappointment in not finding the letters and supplies which they had expected; and they learned to their dismay that the plague was raging in front of them at Khartoum, and that fifteen hundred people had already died of it. At length, however, they took boat for that place, where they were joyously received by the small European population, who had given them up for dead.

At Cairo they heard that the Royal Geographical Society had awarded Baker its gold medal; and on his arrival in England he was rewarded with a knighthood.

Section 3. On the 11th of May, 1848, was discov-

ered that great isolated mountain, Kilima-njaro. It was the Rev. Mr. Rebmann, a German missionary of eighteen years' residence in Eastern Africa, who, wandering inland from Mombasa, discovered the wonderful snowy dome. When, on his return, he told of his discovery to Mr. Krapf, another missionary, the latter started at once for the interior, and, though he only saw Kilima-njaro at forty miles, discovered Mount Kenia. "The results of these two remarkable expeditions were modestly made known to the Geographical Societies of Europe, but in Paris alone did the discovery of Kenia and Kilima-njaro meet with any practical recognition." The silver medal of the French Geographical Society was awarded to the two men "for making known the existence of snow-clad mountains on Eastern Equatorial Africa."

Leaving Kitui on the 3rd of December, 1849, Rebmann also saw Kenia, and observed it to be higher than Kilima-njaro, and that a "multitude of rivers had their rise in each."

In England there was a disposition to doubt the existence of snow-capped peaks in Equatorial Africa; but in 1861 Baron Von der Decken, a Hanoverian, went to Kilima-njaro, stayed from July till September, and entirely corroborated Rebmann and Krapf. He attempted the ascent of the giant cone but failed to reach the snow line, owing to extreme cold. He is the chief authority to-day for the characteristics of this great mountain mass, and of its two great peaks, Kibo and Kimawenz, the former 18,880 feet above

the sea level. For his achievements he received the gold medal of the Royal Geographical Society.

Sixteen years of travel in Eastern Africa placed John Petherick high in the list of her explorers, though no one great discovery is attributed to him. He first entered Africa in 1845, travelled up the Nile, visited the Soudan, and explored from Khartoum to the region of the equator. During his term as English consul he was employed by the Royal Geographical Society to succour Speke and Grant in the years 1861-2. After that he explored the Nile region west of Gondokoro, with careful accuracy.

A survey in 1856 of the greater part of the course of the Orange river by Mr. Moffat (son of the missionary who encouraged Livingstone to go to Africa) was an important addition to "exact geography." And in the following year Damara Land in the southwest was traversed by Messrs. Hahn and Reth as far as the Cunene river boundary of the Portuguese territory. A series of important explorations were made by Gerhard Rohlfs beginning in 1861, in Morocco and in the Moroccan Sahara, and in the equatorial east coast region. In a journey lasting from 1865 till 1867, he crossed the whole north of the continent, travelling from Lake Tchad towards the southwest by an entirely new route and reaching the Bight of Benin.

Among the most important work done during the years 1863-71 ranks that of the great botanist, Dr. Schweinfurth, in the region of the "complicated net-

work of tributaries received by the White Nile west of Gondokoro." He crossed the watershed between the Nile basin and the west, and entered a new drainage area belonging to Lake Tchad. In 1863 he botanized in the delta of the Nile,—"travelled along the shores of the Red Sea, skirted the highlands of Abyssinia, passed on to Khartoum, and, finally, having exhausted his purse, returned to Europe, after an absence of two years, with a splendid collection of plants." He suggested the plan for a botanizing expedition to the equatorial regions west of the Nile, which the Royal Academy of Science sent out under his guidance in 1868. On this journey he reached the neighbourhood of Baker's lake, passed through the country of the Niam-Niam, and visited the unknown kingdom of Monbuttoo.

He was the discoverer of a race of dwarfs in Central Africa called the Akkas. In 1870 he discovered the Wellé river, afterwards known to be tributary to the Congo; and after an absence of three years and four months he returned to Europe on the 2nd of November, 1871.

Other important work in this period of exploration was accomplished by Galton ('51), Gassiot, Silva Porto (a Portuguese trader), Dr. Bastian, Du Chaillu, Du Veyrier, New, Touchard, Young and Grandy.

CHAPTER XX.

LIVINGSTONE AND STANLEY.

Section 1. Encouraged by the veteran Dr. Moffat, David Livingstone ventured to Africa in the capacity of missionary, arriving at Cape Town in the year 1840. From Algoa Bay he proceeded northward to the town of Kuruman on the 31st of May, 1841, where he joined Dr. Moffat's station, and began his labours. In 1844 he married Dr. Moffat's daughter, Mary, and with her continued his work among the natives.

In 1847 he went to Kolobeng, and, establishing his headquarters there, made excursions into the surrounding country.

Hearing rumours of a lake "away in the north" beyond the Kalahari Desert, he started with two Englishmen (Murray and Oswell) to find and explore it (1st of June, 1849). After a toilsome and dangerous journey they reached first the Zonga and then the Tamunakle river, and discovered Lake Ngami. Having no boat he returned on the 1st of August to his wife at Kolobeng, and with her to Kuruman, to recruit his strength.

In April, 1851, he went again into the interior accompanied by his wife, their three children, and his friend Oswell. On urgent invitation he visited Chief Sebituane, "the greatest warrior in Central Africa," and was warmly received; but while he was there his host died.

Soon afterward, while exploring to the north-east in search of a healthful station for his family, he came to the great tide of the Zambesi—the largest river in Southern Africa. But finding no suitable place for a home, he decided to send his wife and children to England, that he might be the more free for his undertaking.

Livingstone was now ready for the journey which was to result in the opening of routes from Central Africa to the west and east coasts, and in the discovery of Victoria Falls. When, on reaching Kuruman, he found that the Boers had plundered his goods and fired the town, he was more than ever determined to open the country to the northward that trade might bring in a civilization capable of controlling such barbarism. Crossing the Kalahari Desert he reached the Chobe river, explored the country round Linyanti, and on the 11th of November, 1853, left that place for Loanda. He travelled part of the way by the Chobe river on land and then took to canoes on the Zambesi.

Visiting Shinte's town, he found it the largest and best planned that he had seen in Central Africa. Through Katerma's territory, through the Chiboque

country, across the Quango river, he sturdily guided his black followers, and at last reached Cassange, a Portuguese settlement, where he was very hospitably received.

He arrived at Loanda on the 31st of May, 1854, much reduced by the fever from which he had suffered nearly all the way, and had great delight in sleeping once more in an English bed, which was supplied to him by the English Commission.

His constitution had been severely tried, but he at length recovered; and on the 20th of September started on his return to Linyanti.

All the rivers in this part of Africa, Livingstone found to have their rise near Lake Dilolo, which he discovered; and they all flowed into one or the other of two main systems: to the north the Congo,—to the south the Zambesi. Standing on this central ridge, Livingstone was astonished to find how slight its elevation really was.

In September, 1855, he reached Linyanti, and started for the east coast along the Zambesi. On the 13th of November, he discovered the great falls which he named for Queen Victoria. Below the rapids, where the Loangwa joined the Zambesi, he crossed the latter river and proceeded to Tete, whence, by way of Senna, he reached Quilimane on the 20th of May. On the 12th of December, 1857, he returned to England "to find himself the most famous man for the time in the British Isles." He had performed "the then unparalleled feat of crossing

Africa from ocean to ocean in those latitudes." He had opened territory "thickly wooded, richly fertile, well watered, and abounding in mineral wealth."

After the publication of his travels he returned to Quilimane in 1858, as British consul, and began the five years' journey on which he was accompanied by Dr. John Kirk.

He first examined the four mouths of the Zambesi and then in a steamboat proceeded up that stream to the rapids of Kebeabosa. He explored the Shiré, the largest northerly affluent of the Zambesi, between Tete and the coast, till he was stopped by the Murchison cataracts. With Tete for his headquarters, he started north in March to search for a great lake of which the natives spoke, and discovered Lake Shirwa in the heart of a beautiful country. He returned to Tete on the 23rd of June, and in August began the journey which resulted in the discovery of Lake Nyassa (16th of September), the most southerly of the great African chain of fresh-water lakes. Remembering the yet unsolved mysteries possessed by the Makololo country, he started for Tete on his second journey thitherward in May, 1860, and reached Zumbo on the Loangwa river in June and the Victoria Falls in August. After a thorough exploration of the country thereabouts he passed on to revisit Seshake.

Returning he passed through Sinemane, Zumbo, Tete, and proceeding slowly down the Kongona river, reached his starting-place on the 4th of Jan-

uary, 1861. After a short rest he went again to Lake Nyassa with the object of completing his map. Upon his return to Shupanga he was overwhelmed by the death of his devoted wife. Silently turning his face inland he hastened to bury his grief in the depths of the wilderness. Conceiving the idea that Lake Nyassa might be reached by way of the Rovuma river, he sailed for that watercourse on the 6th of August, 1862, and, arriving there a month later, ascended it till the cataracts of Nyamtolo barred his progress. On the 19th of May, 1863, he returned by order to England with a new record of several thousand miles.

After a much needed rest he went again into the field, reaching Zanzibar in 1866 to begin his third journey. On the 28th of March, he left that place to reascend the Rovuma. At Nyamtolo he left his boat, made his way south of Lake Nyassa, and journeyed northward through the Lobisa country, which he found occupied by tribes largely engaged in the slave trade. Crossing the valley of the Loangwa, he passed along the north shore of Lake Liembi, thus proving it to be a separate water from Lake Tanganyika.

Proceeding again into the Lobisa region he visited Lake Moero, and then, in 1868, went southward to discover and explore Lake Bemba (or Bangweolo) and its vicinity. The Lualaba river, which he crossed, he took to be a member of the Nile system; but it was afterwards discovered by Stanley to be the upper Congo. He then went back to Lake Moero and along

its east coast, back to Cazembe, and back to Lake Tanganyika. After exploring the west shore of this great lake up to Uguhha, he crossed to Ujiji, in May, 1869, and there took a short but sorely needed rest.

Returning to Uguhha, he started on a journey which led him to Bambarre in July. With that place as a base he explored Lake Kamalondo to the southward, and then the unbroken country to the north, where he discovered many rivers. In August, 1870, he left Bambarre to go farther west, visited Bakoos and Bagenya on the Lualaba river, and discovered a large lake which he named in honour of Abraham Lincoln. In the regions to the eastward he found great stretches of forest set with countless villages. By way of Bambarre he returned to Ujiji in October, 1871, quite worn out physically and at the end of his resources.

Section 2. Henry Morton Stanley, a Welshman by birth but American by early adoption, while acting as correspondent for the New York *Herald,* was commissioned by that paper to head an expedition to learn the fate of Livingstone, from whom but the vaguest rumours had reached the world for two years. Equipped by nature with inexhaustible energies, and by Mr. Bennett with unlimited resources, Stanley started inland from Zanzibar towards the end of March, 1871, with a following of 192 men.

To Bagamoyo, across the Kingani river to Mousondi, to Simbamwenni, to Mbumi near the Usagara Mountains, to Kwikuru the capital of Unyanyembe,

to Kwikara and Tabora, the young commander urged his caravan triumphantly through every obstacle. At Kwikuru he was received with the greatest enthusiasm, but was there laid low by a severe attack of fever which confined him till the 14th of July. He was given a package of letters addressed "To Dr. Livingstone, Ujiji, November 1st, 1870. Registered letters." How long overdue!

On the 29th of July, Stanley set out again, but was stopped at Masangi by a native war. On the 20th of September, though still weak from fever, he again started forward. To the large village of Ugunda, to Manyara through a rich game country, to Utende in Ukonongo, to Mwaru he pressed on eagerly; and at this last village heard from a caravan just arriving that a white man, whom he took to mean Livingstone, was reported to be in "Urua."

He hurried to Mrera, and from there on the 17th of October turned north-west over the valley of Mtambu, a "terrestrial paradise for the hunter." Through Itaga, Kawanga, Niamtaga in Ukaranga, where he was hospitably received by the king, past the great Lake Tanganyika, and at last to Ujiji.

There a black man said "good morning!" and much to Stanley's astonishment another from the throng of natives came to him with an English greeting. They were Dr. Livingstone's servants! With "feelings that were well-nigh uncontrollable," Stanley went to meet the man whom he had come so far to find.

"As I advanced slowly towards him . . . . I noticed he was pale, looked wearied, had a gray beard, wore a bluish cap with a faded gold band round it, had on a red sleeved waistcoat and gray tweed trousers," wrote Stanley. With outward calm he said: "Dr. Livingstone, I presume."

Welcomed with a kind smile and hand clasp, and with a few words of gratitude, he delivered the packet of letters which had been three hundred and sixty-five days from Zanzibar.

The two explorers drank each other's health in champagne which Stanley had brought all the way for that purpose.

Livingstone was found!

To the old explorer Stanley gave a new impulse to work, along with bountiful supplies; and together they embarked for a cruise on Tanganyika to solve the problem of the Rusigi river. They found that it flowed into and not out of the lake as they had hoped. The return voyage covered three hundred miles of water, and they reached Unyanyembe on the 18th of February, 1872.

Livingstone, refusing to return to civilization, now resolved to satisfy himself as to the sources of the Nile. The two men parted on the 14th of March, Stanley taking the homeward way. At Bagamoyo he met members of another "Livingstone Relief Expedition," which disbanded when he told the news of his success.

Soon after Stanley's departure, Livingstone started

on his last journey. Worn with his long labours and all but exhausted, the brave pioneer ventured once more with his black comrades into the unknown wilds. His plan was to pass to the southward of Lake Tanganyika to the south shore of Lake Bemba, then north to the west of the Conda Trugo Mountains to Lake Lincoln, and thence to the "large lake at the north which has never been visited." He had only reached the south shore of Lake Bemba when he found that his strength was failing too rapidly for him to proceed. Weak and almost helpless he crossed the lake to the west shore, and started for Unyanyembe, filled with a great longing for home. But he had delayed his return too long.

For a few days his faithful attendants carried him in a litter. Then he was obliged to stop. "Build me a hut to die in!" he cried. And there in the wilderness his great work ended, in May, 1873. His body was afterwards removed to England and buried in Westminster Abbey.

Section 3. As it was feared in the civilized world that the Stanley expedition had failed, no news being forthcoming, Verney Lovett Cameron volunteered to go in search of Livingstone under the patronage of the Royal Geographical Society. The command of the expedition, however, was given to Lieut. L. G. Dawson of the navy, and on the return of Stanley to the coast with word of Livingstone the company as we have seen, was disbanded. But in November, 1872, a second expedition was put in commission with

Cameron at its head, with the double purpose of assisting Livingstone and adding to the knowledge of the country. Captain Cameron was accompanied by Dr. W. E. Dillon and left England on the 30th of November, 1872. At Aden they were joined by Lieut. Cecil Murphy, and at Zanzibar by Robert Moffat, a nephew of Livingstone's. Cameron was struck down with fever at once, but soon recovered. Having gathered a company of the best followers he could find, though not trained men, he started for the interior by way of Bagamoyo. From Kikoka he advanced by a route parallel with Stanley's. He reached Msuwah, forded the Lugerengeri, passed through the Kungwa hills, and through Simbo to the "dreaded Makata Swamp." Here Moffat died of fever, but the rest, though suffering, went on over a dry desert, and at last reached Ugogo. At Unyanyembe they received a letter from Baker addressed to Livingstone. Here they made a long halt, being all ill with fever; and here, on the 20th of October, Cameron got the news of Livingstone's death. He at once dispatched a messenger to the coast and sadly awaited the arrival of Livingstone's body. It came in a few days, borne by his servants.

With his death the real object of the expedition was gone. Murphy resigned to return to the coast. Dillon decided to proceed with Cameron to Ujiji for Livingstone's belongings, but was seized with an inflammatory illness which compelled him to give up. Because Cameron would otherwise be left alone, Mur-

phy now "volunteered to continue" with him; but his offer was gratefully declined, as the former believed that the smaller the caravan now the better the chance of success.

On the 9th of November 1873, therefore, Livingstone's cortège, escorted by Dillon and Murphy, started for the coast; while Cameron turned his feet westward. They parted with sadness, and though they spoke bravely, they had misgivings as to their ever meeting again. Cameron, reduced to a skeleton by his fever, injured by a fall, and suffering from ophthalmia, was in a condition to remain in bed; but he took up the march with his usual indomitable energy, accompanied only by his servants and an escort of hired natives. As he was leaving for Itumvi a message from Murphy brought the news of Dillon's death on the 18th of November. Cameron, who loved his old companion, was deeply sorrowful, and marched for days as if in a dream. He had reduced his equipment as much as possible, and almost all his provisions had been left behind.

Beyond Mapalatta he journeyed through a pleasant country of "trees delicately green and fresh, [and] open, grassy glades enamelled with various wild flowers." Driven by the natives to Hisinéné to await the permission of the authorities for his advance, he was taken ill again with his fever.

On his recovery he occupied himself in hunting, and declared the flesh of the zebra to be the "best meat in Africa." Soon after Christmas came word

that he might proceed through the disputed village of Ugara; and he presently reached a large and populous place ruled over by the mother of the last friendly chief, who treated him with great hospitality. Entering the country of Ugara he found food plentiful and game of every kind. Then he crossed the south Ngombé, one of the southern affluents of the Malagarazi river, and found it the home of hippopotami, crocodiles, and immense water lilies.

He went next to the village of the chief of West Ugara, where the whole population turned out to see the white man. Cameron's dog, Leo, filled them with amazement. The chief presented the usual goat of African hospitality. It was so tame and became so attached to Cameron that he kept it alive as a pet, and it followed, with Leo, at his heels wherever he went. At Mân Komo his reception was so far from cordial that he hastened across the Sindi to the village of Itambara, the headquarters of the chief of Uvinza, and there was welcomed with every kindness.

To Ugaga, across the Malagarazi, to Itaga, and to Lugowa, Cameron pursued his way, noting at the last place the superior quality of the plentiful salt largely exported throughout central and eastern Africa. Crossing many small rivers he reached Tanganyika on the 18th of February, and proceeded by boat to Kawélé, enjoying the grand scenery of the mountains of Ugoma. He was warmly greeted by the traders, and received Livingstone's papers safely.

On the 13th of March, he left in boats for Point

Mfondo, whence he went by land to Ugunya and camped at Kabongo. On the 23rd of March he rounded Ras Kungwé in his boat and entered a part of the lake never before seen by a white man. On this exploring trip his crew of natives was terribly frightened by storms. At Kabogo Island, on the 28th of March, he found a large population cultivating a rich and fertile soil. Passing many river mouths and islands he camped at the large village of Makukira on the river of the same name. He saw innumerable monkeys along the shores, but was unable to secure one. After leaving the Luguva river mouth he came to the village of Akalunga, one of the largest he saw in Africa.

All the "country was like a huge sponge full of water," springs and rivers everywhere irrigating the land. Game was consequently very plentiful. Cameron wrote—"My expectations and hopes were now greatly raised by the guides promising to show me the outlet of the lake on the following day. It appears that Speke did not get quite far enough down; and Livingstone, coming from Kazembe's town, passed its mouth in a canoe without noticing it, and, on going to Manyuéma, did not come sufficiently far south." On the 3rd of May, Cameron explored the mouth of the (then) outflowing Lukuga! The Lukuga tasted the same as the Tanganyika water: not salt but peculiar, and not sweet and light like other rivers. The caravan then proceeded to Kasengé, and on the 9th of May reached Ujiji where the leader found letters and good tidings from Murphy.

In that part of the great lake explored by Cameron he found ninety-six rivers inflowing, and one, the Lukuga, flowing out. Crossing the lake to Kivira on the 31st of May, he went by land to Ruanda, a town in the centre of a flat, fertile, alluvial plain. Descending the Lualaba river by boat, he reached the permanent settlement of the Zanzibar traders,—Nyangwé,—and then left the Lualaba for a land march to the Rovubu river and Lake Mohrya, which he reached on the 1st of November. After a long stay in the Urna country he started on the 10th of June, 1875, for Bihé. Ulunda, Katendé village, Lumeji river, Kanyumba village, Kuanga river, passed in turn, brought him to the capital of Bihé,—Kagnombé,—the largest town of his African experience. Starting for the coast he visited Belmont, and on October 18th passed the Kutato river, and went on through scenery increasingly beautiful. Large tree ferns, myrtle, jasmine, and other flowering shrubs, and ground ferns afforded wonderful variety of colouring. At sight of the sea his caravan made a rush march to Katombéla (7th of November), and Cameron was greeted there as "the first European who had ever succeeded in crossing tropical Africa from east to west."

After a severe illness, during which he received great kindness at the hands of the people of Benguela, he went to Loanda and found many letters awaiting him. At the end of February, 1876, he sailed for England. He arrived there in April and was welcomed with enthusiasm.

CHAPTER XXI.

IN THE HEART OF AFRICA.

Section 1. Mr. H. Hartley, while on a hunting tour in Matabele Land, in 1866, invited Herr Carl Mauch to accompany him, upon which occasion the latter discovered the great gold fields between the Zambesi and the Limpopo.

A party under Captain Black investigated this discovery, and the gold-bearing region was found to be eighty miles long by two or three in width. Under the fresh impetus thus given, the rich country north of the Transvaal was rapidly and carefully explored.

Mauch, in 1871, found the ruins of an ancient city or fortification named Zimbase, "certainly not of African construction," about two hundred miles west of Sofala. Through this discovery it has been attempted to identify this region with the Ophir of the Bible.

In 1867 a child on a farm north of Cape Colony was found playing with a "brilliant pebble." This pebble proved to be a diamond of twenty-one carats, worth £500! Another of these gems was presently discovered on the banks of the Vaal river, more were

found in 1868 and 1869, and a Dutch farmer secured, for the price of £400, the since famous diamond called "The Star of South Africa," from a native who had kept it only as a charm. Uncut, it weighed eighty-three carats, and the purchaser resold it for £11,000.

When these stories leaked out there was the inevitable "rush" of adventurers and fortune-seekers, and the banks of the Vaal were soon the scene of a great industry, with ten thousand miners feverishly searching the soil. The alluvial "drift" was first washed, with excellent results; but a great find of the gems in "dry diggings" made the development of the country a certainty. "The town of Kimberley sprang up, as it were in a night, and became a great and flourishing centre of activity. A new era for South Africa began with the advent of the digger, the capitalist, and the company promoter, and civilization suddenly advanced its borders far into the wilderness beyond the Orange river.

In that paradox of barren mystery, the world's greatest desert, Sahara, some valuable work was accomplished out of the beaten tracks by Dr. Nachtigal, a German scientist. In 1869 he was commissioned to convey presents from the King of Prussia to the Sultan of Bornu on Lake Tchad, in acknowledgment of that potentate's favours to former travellers. Besides the successful accomplishment of this mission, Nachtigal investigated the central mountainous country of Tibesti in Eastern Sahara, before known

only by vague native rumour. In a later journey, Nachtigal proved the existence of a large river flowing out of Lake Tchad, which had been believed to have only a subterranean outlet or none.

Section 2. Sent out by the New York *Herald* and the London *Daily Telegraph* to complete the exploration of the equatorial lake region, Stanley returned to the scene of his former triumphs. He left Bagamoyo on the east coast for the interior in November, 1874, at the head of three hundred men. From the Monangah river he marched in a northerly direction across a pathless country "seamed with elephant trails, rhinoceros wallows, and gullies which contained pools of muddy water," to the Usiha country, and on the 17th of February, 1875, reached the beginning of the "beautiful pastoral country which terminates only at the Victoria Nyanza."

At Gambashika he had a glimpse of the Urirwi mountains, and at Kagehyi a view of the great lake. On the 27th of February, the long march ended at the water side; and the boat which had been carried in sections from England was hurriedly equipped for the circumnavigation of the great inland sea. On the 8th of March the boat was launched, and the voyage began. The course was eastward along the shores of the wide arm which they named Speke Gulf in honour of their predecessor. Passing rivers, capes, and islands, and villages, Stanley reached the Trangara islands, and there first came into view the main body of the lake,—a "vast amplitude as though of ocean."

Natives, in beautifully made canoes of graceful form, paddled about the boat, offering to trade their fowls, eggs, bananas, sweet-potatoes, milk, and *maramba* or banana wine, for beads. At the hospitable village of Kirudo Stanley was met by an embassy from the King of Uganda requesting a visit. He was received at Usarara, the royal hunting village, by the extraordinary monarch of an extraordinary people, with a pomp and dignity never equalled by any other African ruler.

As the representative of the nations who "know everything," Stanley was subjected to a most searching examination, which he had the wit and good fortune to pass with credit. Mtesa, the "Foremost Man of Equatorial Africa," was a tall, clean-faced, large-eyed, nervous-looking person, clad in a dignified black robe with a white shirt belted with gold. He was intelligent in his questions beyond anything Stanley had expected in Africa, and treated his white guest with every mark of favour. He and his chiefs were of a dark reddish brown or bronze shade and not black; and Stanley concluded that brown must be their national colour, as the canoes and the court robes matched their skins.

At the Uganda capital Stanley met M. Linaat de Bellefonds, a member of the Gordon Pasha Expedition, and found him a most agreeable companion. By the exercise of persuasive tact Stanley succeeded in converting Mtesa and his chiefs to Christianity, thus practically winning over a population of two million souls.

Proceeding along the west coast of the lake, Stanley next explored the head of the Alexandra Nile, the Victoria Nyanza's giant affluent. Of this river he says, "Having explored by water all the coast of the Victoria Nyanza, and having since travelled on foot the entire distance between Nakaranga Cape and Baka Bay, I can state positively that there is but one outlet from the lake, viz., the Ripon Falls."

At Kagehyi Stanley was taken down with a severe attack of fever by which he was terribly reduced both in weight and strength. In November Mtesa gave him an escort to assist him to Lake Albert Edward Nyanza, the Muta Nzigé of the natives; and leaving Uganda,—"land of inexhaustible fertility,"—he took his way to the hostile country of Unyoro. Noting as he passed the glories of the "Switzerland of Africa," he arrived at the shore of the "vast mirror, tranquil and blue" which it was his immediate ambition to explore.

Alas for this ambition! The natives of the Uzimba country refused to allow the white man to remain in their land. He was obliged to go back content with a mere glimpse of the lake which he had come so far to see. He journeyed by way of Windermere lake to Karagwé, where old King Rumanika said he would be delighted to have the explorer stay as long as it pleased him. So Stanley took this opportunity to explore Lake Windermere, the Kagera river, Mtagata hot springs, Maruré lake, and Kiwandaré mountain.

At length he went on to the watershed of Lake Vic-

toria and the Malagarazi river. "From the 17th of January, 1875, to the 7th of April, 1876, we had been engaged in tracing the extreme southern sources of the Nile, from the marshy plains and cultivated uplands where they are born, down to the mighty reservoir called the Victoria Nyanza. We had circumnavigated the entire expanse, penetrated to every bay, inlet, and creek . . . . we had travelled hundreds of miles to and fro on foot along the north coast of the Victoria Sea, and, finally, had explored with a large force the strange countries lying between the two lakes Muta Nzigé and the Victoria, and had been permitted to gaze upon the arm of the lake named by me Beatrice Gulf, and to drink of its sweet waters. We had then returned from farther quest in that direction, ... and had struck south from the Katunga lagoon down to the Alexandra Nile, the principal affluent of the Victoria lake which drains nearly all the waters from the west and southwest. We had made a patient survey of over one-half of its course, and then . . . . we had been compelled, on the 7th of April, to bid adieu to the lands which supply the Nile, and to turn our faces towards the Tanganyika." On the 27th of May Stanley arrived the second time on the border of that majestic lake at the town of Ujiji. On the 11th of June he embarked in his boat on its waters to find its mysterious outlet.

After repeated inquiry and much observation he learned that the lake was slowly but steadily rising. Cameron's find of an outlet in the river Lukuga was

disclaimed by the natives. "There is none," said they.

In the same English-built boat that he had used on the Victoria Nyanza, Stanley started on the cruise which was to decide the question.

The 12th of June found him at the mouth of the Malagarazi river, after exploring which he proceeded to the site of a former camp of his and Livingstone's. A native, who had also been with the earlier expedition exclaimed here, "See!—the Tanganyika is eating the land!" for the beach he had known was under water. Stanley believed that as the lake was expanding with considerable rise from year to year, no outlet would be found draining its flood.

He was right.

The 15th of July brought him to the Lukuga,—a still inlet or arm with no current other than that made by the winds. Choked with vegetation and sand at the mouth, its channel was stopped with mud at no great distance from the lake, and, with the exception of a few pools beyond, the water ended with the navigation. Whatever conditions had existed to convince Cameron that he had made an important discovery here were unhappily of a temporary nature. No outlet existed at the time of Stanley's visit,—the character of the land precluding the possibility of a subterranean river,—but he decided that when the lake had risen sufficiently the Lukuga would undoubtedly act in that capacity. He found by soundings that the Tanganyika, like the other great lakes of his African

quest, was of extraordinary depth, the middle of the lake revealing no bottom at 1280 feet. On the 31st of July he returned to Ujiji, after an absence of fifty-one days, during which he had sailed eight hundred and ten miles round the lake. On the 25th of August he crossed the lake, and took up the march to Manyema. In October he reached Ka-Bambarré, where Livingstone's memory was cherished with all sincerity by the natives. Soon after crossing the Luama river, he came to its confluence with the Lualaba, or Livingstone, which he was the first white man to observe,—and there committed himself to the task of following the latter river to the sea.

Filled with enthusiasm, he urged his men to extreme haste on the march to the Arab village of Tubanda, where he was greeted by the famous trader and slave-dealer,—Tippu Tib, handsome and clean as to apparel, intelligent and agreeable as to manner.

There he heard that the reason Livingstone and Cameron had not gone down the Lualaba was because they had not been able to persuade the people to sell or lend canoes. He was warned of the extraordinary dangers that would inevitably attend such a journey as he had decided to make, but nothing daunted he clung to his dear ambitions, and succeeded in making a contract with Tippu Tib to accompany him part of the way. The 27th of October was the day of their arrival at Nyangwé,—the north-western limit of the visits of Arab traders from Zanzibar.

The caravan left Nyangwé on the 5th of November

and marched to the north-east on the east side of the river. Stanley said, "The object of the desperate journey is to flash a torch of light across the western half of the Dark Continent." The enormous company of nine hundred men (154 of them Stanley's and the rest Tippu Tib's) entered the great black forest of Mitamba on the 6th of November, little realizing the dreadful difficulties to be encountered. Monkeys and snakes were abundant, and seemed to thrive in the close damp atmosphere, but the men found it an effort to even breathe, and, as they were also obliged to toil strenuously in order to make any progress, their sufferings were terrible. Tippu Tib prayed to be released from his contract when he had gone no farther than Kirumbu, saying, "I never was in this forest before, and I had no idea there was such a place in the world; but the air is killing my people. You will kill your own people if you go on . . . . This country was not made for travel; it was made for vile pagans, monkeys, and wild beasts. I cannot go farther." But at length he consented to accompany Stanley twenty marches more.

On November 19th they reached the Livingstone, brown and silent, flowing down "to the unknown." Stanley launched his portable English boat and with the help of some native canoes conveyed his entire expedition to the opposite side, where he found himself in the Wenya district,—the beginning of the cannibal country. Against all Tippu Tib's dissuasive efforts Stanley continued down the river to the

Ukassa rapids through a land which threatened every disaster.

Through rapids, past villages, islands, rivers, and creeks, he urged his men against the opposition of the natives; fighting when forced to it, making peace where he could. At Vinya-Njara, on the 22nd of December, Tippu Tib was released from his contract and paid off. After a Christmas celebration in which the whole company participated, he parted from Stanley, who, with one hundred and forty-nine souls, now made final his decision to reach the end of the Livingstone or die in the attempt.

Down the steady current he voyaged till he came at last to the first cataract of Stanley Falls, which his one white companion, Frank Bocock, christened in his name. There the first portage was made with great difficulty, and the expedition again embarked in smooth water,—an operation which was repeated seven times before these falls were passed.

Maintaining his strength marvellously on a diet of bananas and tea, Stanley came at length to that great expansion of the river now known as Stanley Pool, which measured two thousand five hundred yards across. Livingstone Falls were reached on the 16th of March, 1877, beyond which for a long distance the falls, rapids, whirlpools, etc., were incessant.

At Zinga point, in an attempt to go over the cataract of Zinga in a canoe, Frank Bocock, Stanley's only remaining white companion, was drowned. Stanley was overwhelmed by this loss, and being af-

flicted with fever at the time, found it difficult to recover from the blow.

Regaining at last his usual vigour, he passed successively Mbelo, Ngombi, and Itumzima Falls, and arrived at Kilolo on the 28th of July. He reached "Covinda Cove" of Tuckey on the 30th, and on the 31st the boat which had travelled nearly seven thousand miles up and down Africa was regretfully abandoned. A march overland for Embomma carried the expedition only so far as Nbambi Mbongo, where the refusal of the natives to sell them food compelled a halt, till supplies could be got up from Embomma.

On the 9th of March, the nine hundred and ninety-ninth day from Zanzibar, Stanley came once more face to face with civilization. He was entertained enthusiastically at the Portuguese settlement, whence he journeyed to Cape Town, and back to Zanzibar, on the 26th of November. On his return to Europe the record of his achievements was greeted by the acclamations of the civilized world.

"He established that the Congo or Livingstone with its multitude of tributaries is the second longest river in the world, with a length exceeding three thousand miles, draining a basin of 1,300,000 square miles, and discharging into the Atlantic Ocean a volume of water exceeded by that of the Amazon alone."

Section 3. When it was decided that a governmental expedition was impracticable for the rescue of Emin Pasha, governor of the abandoned province of

the Egyptian Soudan, Stanley volunteered his services free of remuneration to a company organized by subscription. He reached Zanzibar on the 21st of February, 1887. With Tippu Tib and a large band of followers he proceeded to the mouth of the Congo by way of the Cape, and arrived at the scene of his former successes on the 18th of March. By means of small vessels the expedition was transported to the head of navigation at Matadi on the lower river, and then marched two hundred miles past the cataracts of Stanley Pool, where navigation was resumed. Stanley expected to be back in England for the Christmas of the same year; but it was almost three years before he saw home again.

The mouth of the Aruwimi, the real starting point of the expedition (1,500 miles from the Congo's mouth), was not reached till the beginning of June. The distance from there to the nearest point of the Albert Nyanza was about four hundred and fifty miles. Knowing that Emin had two steamers, they believed that communication with him would be easily gained. While travelling through the "terrible forest" the men were obliged to carve a path with axes, and this prolonged strain so weakened their energies that on returning to river travel again they had hardly strength left for the necessary portages.

On the 16th of September, two hundred miles from Yambuga, where part of the expedition had been left, the rescue party reached the slave camp of Ugarowwa. The slavers had laid waste the country in all direc-

tions, and between the 31st of August and the 12th of November the travellers were almost famished, arriving at the native village of Ibwiri mere skeletons. Out of the three hundred and eighty-nine men who started, only one hundred and seventy-four entered Ibwiri, and so weak were these that they had been compelled to leave behind them, under guard, the boat and most of their goods. After thirteen days at that place of plenty, however, where fowls, eggs, bananas, cream, etc., proved a potent medicine to their energies, one hundred and seventy-three vigorous men set out for the Albert Nyanza.

On the 31st of November the "gloomy forest suddenly ended," and an open country, with the light of day no longer obstructed, cheered their eyes. Some little fighting was forced upon them before the goal was reached; but on the 12th of December the beginning of the long descent of the watershed was gained, and "suddenly the eyes of all were gladdened with the sight of the lake some three thousand feet below." The expedition stood at an altitude of five thousand two hundred feet above sea level.

On reaching Kakongo they met with an unfriendly reception. In response to their questions the natives said no Emin Pasha had ever been heard of. There was nothing to show that the messenger sent from Zanzibar to announce Stanley's coming had reached the governor. The only boat of the expedition was at Kilinga Longa's,—one hundred and ninety miles away! Stanley resolved to return to Ibwiri, and

the 7th of January found the whole party back in that land of plenty. There Fort Bodo was built, and the stragglers rejoined the main expedition, so that on the 7th of August, 1888, when Stanley started again for the lake he had the assistance of two officers.

With the boat in sections and plenty of stores they proceeded over the old path where this time the natives were friendly. The chief Kavalli delivered a letter to Stanley from Emin Pasha, saying that he had heard rumours of Stanley's presence in the land and asking the latter to wait till he could come to him. Stanley at once had his boat launched and sent Lieut. Jephson, one of his officers, off to find Emin. On the 29th of April a "steamer came down the lake with Emin, the Italian Casati, and Jephson on board." The "great object of the expedition seemed at last to be all but fulfilled." But the work was not all done. There were still the sick along the way, the party at Fort Bodo, and the rear column at Yambuya, all to be brought up before starting for home. Time would be required also to gather and transport the people of Emin from Wadelai and other stations. Emin did not want to be "rescued." After enduring three weeks of the Pasha's vacillations, Stanley started on the 25th of May to return to Fort Bodo to collect his men, leaving Jephson and a guard with Emin.

The fort when reached on the 8th of June was in a thriving state, with acres of flourishing fields under

cultivation. All the stragglers who were left alive came to the Fort, but no word from the rear column had been received. On the 16th of June, Stanley started on the search journey which might lead him all the way back to Yambuya,—back through that terrible forest to find out for himself what had caused the delay! With plenty of provisions, but no white companion, he led his devoted blacks to an unplanned rescue. On the 10th of August he learned that three of the carriers he had sent to the rear had been killed. On the 17th he found the rear column at Bonalya, eighty miles above Yambuya, and there first heard of the dreadful disaster that had befallen it. Major Barttelot, the officer in charge, had been shot by the Manyuema, and of the four other officers only Dr. Bonny remained. Out of two hundred and fifty-seven men only seventy-two were left, and of these only fifty-two fit for service! At this point Stanley sent home his first letters, which reached England on the 1st of April, 1889, when the expedition had almost been given up as lost.

Reorganizing the remnants of his men he plunged once more into the forest, and this time by a route on the north side of the river, through a region so wasted by Arab slave hunters that the company was reduced almost to starvation, he again reached Fort Bodo, on the 20th of December. There he found conditions about as he had left them. No word from Emin awaited him, though that gentleman had promised to be at the Fort.

The whole expedition now marched towards the lake, and Stanley, pushing ahead with a small company, arrived for the third time, on the 18th of January, 1889, to find that Emin and Jephson had been made prisoners by the former's own men. The Mahdists had attacked the station, a panic had resulted, and disorder reigned. But at last the principals came together again, and Stanley strove to persuade the governor to arrive at a decision. When at last he prevailed, the main purpose of the expedition was accomplished, but at what a cost in time, life and money! The object of the world's solicitude was now ready to be helped where he could not help himself.

Soon after the start for Kavalli's on the 10th of April, an almost mortal illness laid the great leader low, and it was a month before he was able to take up his responsibilities again. On the 8th of May the huge caravan of one thousand five hundred people was fairly on its way back to civilization. With the exception of some fighting with raiders the homeward way was comparatively free from difficulty. On the 6th of December, Stanley once more entered Zanzibar, which he had left two years and ten months before.

Section 4. One of the illustrious among African explorers was Joseph Thomson, who died in 1895, aged but thirty-seven. Like so many other explorers he was a Scotchman, and born with a passion for travel and adventure.

In 1878, at the age of twenty, he was appointed

geologist and naturalist to an expedition sent out by the Royal Geographical Society under the leadership of Keith Johnston, the younger, to find a practicable route to the interior from the east, and to explore the region between Lakes Nyassa and Tanganyika.

Thomson succeeded to the command in June of the following year, and explored the disputed west shore of Lake Tanganyika.

On another expedition he made a remarkable journey from Mombasa through the country of Masai, among the "most ferocious savages in the world" (1883-4). He reached Kilima-njaro on this journey, and was the first to visit that mountain from the north.

In March, 1885, Thomson entered the mouth of the "mighty Niger," and with extraordinary speed made his way to Sokoto and Gando, securing for the National African company the right by treaty to navigate the "great commercial highway of West Africa," and its tributary the Benué.

In 1895, when his first expedition reached Lake Rudolf, Dr. A. Donaldson Smith had more than accomplished the object of his journey. The company had been a year on the march, and had not only reached its goal, but "had successfully explored much more country" than Dr. Smith had anticipated being able to cover in that time. He then made a fortnight's journey up the Mela river, and on that side trip planned to some day "pursue the setting sun" across the vast plains from Rudolf to the Nile.

This plan resulted in the organization of a caravan at the coast in 1898. But the whole winter of '98-'99 was spent in the jungle of Somaliland waiting for a chance to cross the border,—political complications and the "gratuitous interference of the consul-general" preventing. During May and June he fitted out another expedition (the third for this purpose), and at last managed to get "out of the reach of incomprehensible officials."

On the 1st of August, 1899, he started into the interior from Berbera, with forty-eight men and the intention of exploring beyond Lake Rudolf to the west. To the Shebeli river via Milmil, Sesebane, and Sheweli, he made the first stage of his expedition; and thence went on to Godi, El Dere, Le, and Mega,—the latter a beautiful, broad, open plain between mountain peaks, where there was "a delightful freshness in the atmosphere and in everything living." A Gurka attached to the expedition exclaimed, "Ah, Sahib, if we could always have it like this!"

From an elevation of five thousand feet the land suddenly dropped to seventeen hundred feet above sea level, and great was the difficulty experienced in lowering the camels to the new level.

November saw the caravan again among the mountains,—this time near the south-east end of Lake Stefanie. Dr. Smith made the ascent of Mount Janissa (5600 feet) for a view of the country. "Elephants were ubiquitous; you could scarcely move in any wooded valley without disturbing many of them."

He said of his Somali attendants that they were "howling, hungry. humbugs," but in superb physical condition, swift-footed, of great endurance, and intelligent. After much discomfort from lack of water and from exhaustive marches the expedition reached Lake Rudolf, whence Dr. Smith found that the "formerly rich tribe of Rusia had ceased to exist, and except a few representatives of the Hamerkuki tribe" they met no human beings at all till they reached the river Nianam.

On his first journey Dr. Smith had followed up what he supposed was the Nianam for a long distance to Mela. "But since I was there," he writes, "that illustrious traveller, the late Captain Bottego, discovered that the Mela river made up only a part of the Nianam, and that this was joined by another river, the Omo. It is clear to me now," he continues, "that my river, which I will call the Mela, and the Omo together in equal volume joined to form the Nianam, the name given by Count Teleki to a large stream flowing into the lake." Here occurred a remarkable change in the fauna. An entirely different set of birds, of over a hundred varieties, was found in the Nianam region, and the mammalia, too, were unlike the animals of the maritime country.

They were advised by the natives of this section to travel to the north or south, but persisted in the westerly course till after Christmas, regardless of paths and getting literally "into many a hole." Then, taking a northerly direction, they reached the Omo

where it bends from the north to the east round the Mela hills, penetrating on the way dense forests of "giant sycamores, mimosa, cedar, and tamarind trees."

The way now led westward along a fertile alluvial plain to the base of a low mountain range, and from his observations Smith was inclined to the opinion that Lake Rudolf, the Nile, and the Sobat were once united in a vast inland sea.

Crossing the low mountains to a broad valley where flocks and herds of domestic animals flourished on the abundant grasses and water supply, they saw to the westward a splendid mountain range stretching for twenty miles along the valley. Mount Etua, the highest peak, thrust its bare crown over seven thousand feet into the air, and was seen later by the expedition at over forty miles distance. The high mountains of this country were found to be of volcanic origin. The soil of the valleys, for the most part covered with woods, is of the richest alluvial earth underlaid with clay. Progress through these valleys and uplands made Smith wish for tweeds instead of khaki. "Except for the goatskin apron worn by the women, the Mushas contented themselves with the same cleanly nakedness that was the fashion from the Boran to the Egyptians."

The journey led next to another mountain range, to a large watercourse flowing west, and to a new tribe of natives,—the Magois. These people were different both in appearance and customs from any before en-

countered. Their dress consisted mostly of tattooing but many ornaments were worn. In the attempt to continue west a desert plain of sand caused considerable suffering to the company, the lack of water at last compelling them to turn back. A south-west march brought them to the Katua tribe of cow-worshippers. All the natives were alike in their fondness for the "wonderfully fashionable little red sim sim (beads)." Pressing on to the south-west the caravan crossed the great desert of the Sobat to the mountains where the Akara and the Dinka Dings lived on the most friendly terms. On the 22nd of February, 1900, they rounded the extreme northern end of the Dinka Ding Mountains and camped at Lumin.

"Although there was much to interest me, I cannot reflect on my journey," writes Smith, "from the time we reached the great desert of the Sobat until we arrived at the Nile, with pleasure unalloyed, for shoving along a caravan of dying camels and would-be dead Indians, by the help of careless Somalis and a few tired though good-natured Indians, for many weeks, is a thing that one cannot forget."

At the large village of Omin they found the many natives entirely friendly, of "magnificent physique, pluck, and skill in the use of the spear and bows and arrows."

At Lorkale Smith was given an audience by King Amara, and found him a very capable man. He came to the white man's camp with about two hundred soldiers to exchange presents, wearing a dark blue uni-

form quite "spick and span,"—a handsome, tall, broad, strong, and splendid specimen of a Soudanese. Dr. Smith believed the country to the west of Tarangela to have been thoroughly explored by Emin Pasha, Sir Samuel Baker, and members of the MacDonald expedition, but found his own map to be the only one giving any detail.

Two days'marches brought the caravan to a village governed by a "lady chieftain," and Dr. Smith wrote: "I confess the position was rather strange to me to be sitting with a well-formed lady clad in the same manner only as Gunga Din, and talking over weighty matters involving the welfare of her subjects."

Amara had told Smith that there was an Englishman stationed on the east bank of the Nile considerably south of Lado. At Loker's he learned that no steamers had come up the river, and that no canoes were to be had. At Fort Berkely, on the 14th of March, 1900, Dr. Smith met Captain Dugmore and remained his guest for nearly seven weeks, but in April Major Peake appeared in a gunboat and took the explorer with him over the 1100 miles of water to Omdurman. Smith reached Cairo in the early part of June, ten months from the beginning of his journey. A fortnight later found him in London with his collection of specimens safely installed at the British Museum, to which he presented many birds, plants, mammalia, reptilia, batrachia, fishes, butterflies, etc., a number of them new to science.

The rest of his treasures of natural history he gave to the Academy of Natural Sciences of Philadelphia.

Section 5. In 1896, Mr. H. S. H. Cavendish left England for Aden to explore Lake Rudolf and the surrounding country. Lieutenant Andrew accompanied the expedition, which entered Africa by the most usual east coast route.

Cavendish observed concerning the Boran people that they were the most industrious race, as well as, by a natural result, the richest tribe of his African experience. Their trade in rubber, fibre, rope, honey, gum, and ivory with the Somali coast, had earned them wealth. In January, 1897, the expedition left Egder, diverging from Dr. Smith's route, and proceeded over a new line almost due west for Lake Stefanie, through a very rough and mountainous country.

Three days' march from the Galena brought them to the southern extremity of the lake, where they were so fortunate as to find " perhaps the most useful thing that has been found in tropical Africa,—that is to say, coal, and coal in large quantities." The hunting of elephants and leopards as they proceeded gave excitement to their days, which in any event were filled with variety.

West of Lake Stefanie they visited four tribes of people, sometimes living not more than ten miles apart, each absolutely unlike the others and speaking distinct tongues, one tribe wearing no clothes and the next swathed in home-woven cotton. They saw

the cultivation of coffee and the manufacture of spears by a tribe neighboured by people who worked only enough to obtain food. But the god of most of these tribes was the same and called Wak, though small time or attention was given to his worship by any of them.

North of Lake Rudolf, Cavendish and Andrew separated to explore both the east and west shores and to meet at the south end. Cavendish crossed the Omo river among the crocodiles and hippos in a dugout belonging to a tribe of fishers, and turned southwards. Arrived at Mount Lubur, "one of the landmarks of the country," he ascended it though with great difficulty, and found a crater nearly two miles across, where grass was growing amid fresh-water springs! It was used in war time by the natives as a stronghold for their flocks and herds, there being on one side a path which, if difficult, was easily defended. To the westward, as far as the eye could reach, stretched a great mountain chain mostly covered with forests.

The Turkane country he found possessed of a great tribe of people "perfectly united under one big chief"—a quite blind, but "very bad old man." Cavendish thought them very ugly men, but was astonished at their powers of endurance. They were the fastest runners of all east Africa, excelling even the Masai in that respect.

Cavendish examined some islands with silver coloured banks in Rudolf, and then passed on through

country before explored by Count Teleki, coming at last to the south end of the lake and the place where Teleki's active volcano had been. It was now replaced by a flat plain of lava. The natives told Cavendish that six months earlier the lake had overflowed so that the waters met the mountain and a vast explosion had occurred, after which the waters swept in where the crater had been, put out the fire, and retiring left only a cold field of lava extending to the shore. They also said that a new crater had opened three miles down the lake, and that it was slightly active.

Cavendish rejoined Andrew at a point on the east shore, and together they turned south towards Baringo. But being delayed for guides over the almost impassable mountains, they discovered an entirely unknown body of water about thirty miles south from Lake Rudolf, with barren shores enclosed by mountains. It was fed by two streams and interrupted by several rocky islands. Near the north end a smouldering volcano was discovered which Cavendish named after Lieutenant Andrew.

Experiencing many difficulties and privations they continued towards Baringo, noticing a very high mountain, to the north-east of the Inuro plateau, and passing through a great lion country. At Lake Baringo they heard of white men in the neighbourhood (Mr. Jackson and Dr. Macpherson of the Uganda protectorate). Following Schlater's road to Kibwezi, and thence the Mackimmon road, they reached the

head of the Uganda railway and the vanguard of civilization.

As the century drew to a close, the Sus country, lying between the Atlas Mountains and the desert was still a "*terra incognita* to the explorer as well as to the trader." For, though Rohlfe and others had penetrated thither in disguise, the region was "too dangerous to bear prolonged investigation."

In 1897 Major A. Gibbon Spilsbury accepted an opportunity of visiting this unknown region on behalf of a "charter company," welcoming the chance to explore it even without the advice and assistance of his government. Against the wishes both of the English and the Moorish governments, he entered this forbidden land undisguised. A fishing schooner from the Canaries landed him on the coast in July, and, contrary to the expectations of all who knew his errand, he succeeded in concluding a treaty with the tribes of Sus.

His plan of breaking down the obstacles of fanaticism and throwing open this wealthy district to the markets of the world was not fully accomplished, it is true, but in December, 1897, he sailed from Antwerp in the "Tourmaline" to initiate the commerce provided for in his treaty.

Space does not permit of more than passing mention of the names of Messrs. Young, Jessi, Von Wissmann, De Brazza, Johnston, Höhnel, Reach, Bottigo, Parkinson, and Dunbar, who have done valuable work in solving the mysteries of the Dark Continent.

PART SEVEN.

ASIATIC EXPLORATION.

CHAPTER XXII.

ASIATIC EXPLORATION—1800 to 1825.

Section 1. A map of the world, published as the frontispiece to Jules Verne's *Great Explorers of the XIXth Century,* and shaded to indicate the known and unknown regions of the world at the beginning of that period, shows all of Asia as ground already explored. This is to some extent misleading.

At the beginning of the century European geographers had a very imperfect knowledge of the physical features of the huge Asiatic continent, the home of the most ancient civilizations and the theatre of some of the most interesting and remote events in the recorded history of the human race. Wide tracts, indeed, were to the Occidental nations absolute *terræ incognitæ.* Even of those portions of south-western Asia whose history was most familiar through the Sacred Scriptures and the writings of some of the Greek historians, our geographical information was

scant out of all proportion to our historical knowledge.

Section 2. In Asia during the early part of the century, the south and south-west received the bulk of attention. The two chief points of departure from which exploring expeditions may be said to have radiated, were British India and Asia Minor. The latter country is one of peculiar fascination for the historical geographer. It has been compared to a bridge between Asia and Europe, across which has advanced and receded, since the beginning of history, the struggle for dominance between the East and the West. The work of Colonel William Martin Leake in this interesting region at the very beginning of the century (1800-2) calls for mention, his map of the peninsula being the best of its time.

Between 1802 and 1811 Ulric Jasper Seetzen, a brilliant and scholarly German explorer, made important journeys in Syria, Palestine and Arabia. In spite of crusades and pilgrimages, the vaguest ideas prevailed in Europe concerning the Holy Land, and to a trained scientific explorer like Seetzen, it offered a rich field. By way of Constantinople he reached Aleppo, where he spent some years in perfecting his knowledge of Arabic, studying the works of Eastern historians and geographers, and carrying out various scientific researches. Thence he proceeded to Damascus which was to be the starting point of his more important expeditions.

In Syria he explored Baalbec and the Lebanon

valley, and the districts of Rasheiya and Hasbeiya at the foot of Mount Hermon.

His first expedition into Palestine was through the little-known province of Hauran, in the north-east, and a small district named Ladscha. He writes: "That portion of Ladscha which I have seen is, like Hauran, entirely formed of basalt, often very porous, and in many districts forming vast stony deserts. The villages, which are mostly in ruins, are built on the sides of the rocks. The black colour of the basalt, the ruined houses, the churches and towers fallen into decay, with the total dearth of trees and verdure, combine to give a sombre aspect to this country, which strikes one almost with dread. In almost every village are either Grecian inscriptions, columns, or other remnants of antiquity; amongst others I copied an inscription of the Emperor Marcus Aurelius. Here, as in Hauran, the doors were of basalt." After suffering arrest at the hands of a band of Arabs, he returned to Damascus.

Early in 1806, disguised as an Arab physician, Seetzen again entered the Holy Land. This time he succeeded in traversing the country east of the Jordan, rounded the southern end of the Dead Sea, and reached Jerusalem. Some of the points of special interest touched in the course of this journey, were the famous Sea of Galilee, the Waters of Merom, Mount Nebo, and the ruins of Rabbath. His route lay in part, through what was anciently the land of the Ammonites, Moabites, and Gileadites, and later,

under the Romans, a portion of the famous Decapolis. Numberless ruins testified to the ancient prosperity of the country.

Ten months later, Seetzen again visited the Dead Sea, at that time unexplored, which later investigations have proved to be the deepest lake basin in the world. Its intensely salt, dense, and nauseous waters, shut in by lofty cliffs, are suitably set in a desolate region of sulphur, salt-desert, and lava. Bahr Lût, or Dead Sea, is the name by which it has been locally known from time immemorial. After two years spent in Egypt, Seetzen in 1809 explored the Sinai peninsula, and then turned his attention to Arabia. Having publicly professed the faith of Islam, he visited Tor and Jeddah, and gained entrance as a pilgrim into the sacred cities of Mecca and Medina. He was the first traveller since Ludovico Barthema (1503) who visited Mecca, and the first European to even see the city of Medina, which contains the tomb of the Prophet. He was again in Mecca in 1810. The following year, while in Yemen—the capital of which, Sana, he described as "the most beautiful city of the East"—he was robbed of his collections and baggage. Thus his diaries and observations, the important results of all his work in Arabia were lost. Soon after, word of his death reached the ears of Europeans in the Arabian ports.

Section 3. The work of John Lewis Burckhardt, a Swiss by birth, followed close upon that of Seetzen in the same regions. A man of profound scholarship

and adventurous spirit, Burckhardt devoted his life from 1809 to the time of his death in 1817 to the practical study of the East. In order to facilitate his investigations he took the name of Ibrahim-Ibn-Abdallah, and disguised himself as an Indian Mussulman. Three busy years spent at Aleppo fitted him for the adventurous journeys which he had in mind. During this time he made excursions to Palmyra and into Hauran and Gor. In the course of one of these, having fallen among thieves, and been deprived of all his possessions but his trousers, we are told that his difficulties were increased by the wife of the robber chief imperiously demanding his sole remaining garment.

During 1812 and 1813 he examined the sources of the Jordan, visited the Dead Sea, which receives the waters of that famous river, and made important additions to our knowledge of those parts of Palestine already described by Seetzen. Regions which could then only be traversed by a stranger at the peril of his life are now accessible to the ubiquitous tourist.

After two years spent in Egypt and Nubia, Burckhardt returned to Asia, this time choosing Arabia as his field. Like Seetzen, he succeeded in entering both Mecca and Medina in the guise of a pilgrim, and his was the first full and detailed account of these cities which had been given to the world. He describes El Haram, the mosque containing the Kaaba, in which is enshrined the famous "black stone," worn by the kisses of millions of pilgrims; Zemzem, the sacred

well; and the "Gate of Salvation;" and gives a picture of the terrible mortality which descends upon the crowded city towards the end of the pilgrimage. He died at Cairo in 1817, unfortunately before he had carried his explorations into the Arabian interior. Of that western strip of the country lying along the Red Sea, which was the scene of his later journeys, his published account is full, graphic, and was at the time a solid addition to geographical knowledge.

Between 1821 and 1826 a complete survey of the Arabian coasts was carried out by Captains Moresby and Haines, R. N., by order of the British Government, as a basis for the first trustworthy map of the peninsula. The journey of Captain Sadler, of the Indian Army, also calls for particular mention. In 1819 he crossed Arabia from Port El Katif, on the Persian Gulf to Yambo on the Red Sea. He was the first European to accomplish this journey.

Section 4. In the beginning of the century the attention of more than one European nation was turned to Persia, and political ambitions led to a great expansion in our knowledge of the country and its people. The British East India Company in particular realized the necessity of establishing friendly relations, with which end in view many embassies and missions were despatched to the Persian Court. In most cases these were accompanied by geographers and trained scientific observers. One of the earliest of these missions was that of Sir J. Malcolm in 1808.

On his staff was John Macdonald Kinneir, whose memoir on the geography of Persia for long took its place as the chief authority on the subject. Kinneir spent the years from 1808 to 1814, travelling in Asia Minor, Armenia, Kurdistan and Persia. In many instances his route lay "through countries never before traversed by any European since the days of Alexander the Great." He ascertained the courses of the principal rivers which contribute towards the formation of the Euphrates and Tigris, and discovered the lakes of Nazook and Shello. His narrative of his journeys is full of interest and exciting incident.

As early as 1802, Scott Waring had visited Persia from India, and his journey was not without geographical results.

In 1808-9 James Justinian Morier, as secretary to Sir Harford Jones's mission to the Persian Court, travelled through Persia, Armenia, and Asia Minor to Constantinople. He traversed again the same countries between 1810 and 1816, adding to our knowledge of the geography of the northern part of Persia. So true were Morier's powers of observation, and so sympathetic his study of the country, that his oriental romance "Hajji Baba of Ispahan" ranks as a classic.

Another distinguished name associated with much the same region is that of Claudius James Rich. As the East India Company's Resident at Bagdad from 1808 to 1823, he took advantage of his opportunities to travel extensively in that neighbourhood and in

Kurdistan, to visit Babylon, Nineveh and Persepolis, and to descend and survey the Tigris. The travels of James Baillie Fraser in Persia in 1821 and later, also made contributions to our geographical knowledge of the country.

Section 5. In India, geographical exploration, in the main, went hand in hand with the extension of British influence. The most important enterprise, from a scientific standpoint, was the beginning in 1800 of the great trigonometrical survey of the country. With its accompanying topographical and geological surveys, this great undertaking has required practically the whole of the century for its completion. The individual work of some of its officers will call for particular mention in later chapters. With its initiation is associated the name of Major Lambton.

At the same time much was done by the East India Company to encourage explorers to make known its vast domains, and the countries bordering upon them. In 1808 an expedition under Lieutenant Webb was sent to explore the sources of the Ganges, the sacred river of the Hindus, concerning which conflicting reports prevailed. After following this river through its fertile plains, the expedition left good roads behind, and entered a country so difficult that the bulk of the baggage had to be abandoned. Webb himself finally gave up the attempt to proceed, and waited at Sirinagar while certain members of his party pushed on to the point sought, and returned to him with

their report. Webb describes the source of the Ganges, in rather ambiguous English, as follows:—"A large rock, on either side of which water flows, and which is very shallow, roughly resembles the body and mouth of a cow. A cavity at one end of its surface gave rise to its name of Gaoumokhi, the mouth of the cow, who by its fancied resemblance is popularly supposed to vomit the water of the sacred river. A little further on advance is impossible, a mountain as steep as a wall rises in front; the Ganges appeared to issue from the snow, which lay at its feet; the valley terminated here. No one has ever gone any further."

The expedition returned by another route, visiting on its way the sources of the Baghirati and the Alkanunda, tributaries of the Ganges.

In 1817, Captain J. A. Hodgson visited the source of the Ganges, and that of its affluent, the Jumna, carrying a survey to the heads of these rivers. He went farther than Webb, and describes the Ganges as first emerging into light from a low arch in the midst of an enormous mass of frozen snow, at a point in the Himalayas 12,914 feet above the level of the sea. A similar mass of snow, between perpendicular walls of granite, appeared to give birth to the Jumna.

Section 6. Afghanistan and Baluchistan geographically form an eastern extension of the Iranian plateau, and were indeed, for a long period of their history, politically a portion of the Persian monarchy, which they now separate from British India.

In general terms they may be described as an extensive sandy plateau, having a mean elevation of about 3000 feet, and rising into highlands and mountain ranges in the north, east and south. Except for the fertile regions which border the rivers, the bulk of the country is waste, and much of it desert. Some of the streams of Afghanistan, after flowing bravely for a hundred miles and more, enter the desert, dwindle ingloriously and disappear. The Helmand, the chief river, empties its waters into the great Haman Swamp in the west.

In 1808 Mountstuart Elphinstone was despatched as a British Envoy to the Court of Afghanistan. This embassy, which was a large and important one, started from Delhi, crossed the northern part of Rajputana, and a portion of the Indian Desert, to the Suliman Mountains, and turned northward to the border city of Peshawur. To this place the Afghan monarch came to give audience, as it was impossible at that time for the embassy to proceed farther, owing to the intestine warfare which was then disturbing the country. The British returned to Delhi by another route, through the Panjab, the country of the Sikhs.

Although Elphinstone did not penetrate beyond the eastern border of Afghanistan, he gathered a great deal of important and new information about the country, which makes his book on the subject still of value. On his staff was Lieutenant J. Macartney, who collected materials for a map of Afghanistan. While skirting the Suliman Mountains, an expedition

from the embassy explored and ascended the peak called Takt-i-Suliman, upon which according to one ancient legend, the ark of Noah rested after the deluge.

Section 7. More important from a geographical point of view was the expedition under Captain Christie and Lieutenant Pottinger, in 1810, across Baluchistan, Afghanistan's little-known southern neighbour. The previous year these two officers had accompanied a mission to the Emirs of Sindh, in the course of which they had examined the delta of the Indus, and acquired important documents relating to the country traversed by that river.

Baluchistan is apparently almost as destitute of rivers as Arabia, and at the beginning of the century its people were so fanatical that it would have been impossible for a European to travel far among them except in disguise. Hence it need scarcely be said that the undertaking on the part of Christie and Pottinger to traverse this country and join Sir J. Malcolm in Persia was one likely to be attended with both danger and difficulty. Disguised as Cabuli horse-dealers, they started from Sunmiani, a seaport in the extreme south-east, and travelled northward along the course of the Purali river to the little town of Bela, through a region of morass varied only with jungle. Thence they pushed on to Kelat in the north-east, the capital of Baluchistan, passing at times among outlying mountains of the Hala range, and experiencing cold severe enough to freeze the water in their leather

bottles. After some delay at Kelat they crossed a dreary and sparsely populated district, whose only river runs dry in the summer, to Noutch (Nushki), a small village on the Afghan border, north-east from Kelat.

Here the idea occurred to them to continue their journey by separate routes, thus making it possible to acquire a much more extensive knowledge of the country. Christie selected a course which would carry him first well into the north of Afghanistan, and then westward on to Persia, while Pottinger chose a line far to the south of this, but having the same objective. This was scarcely decided upon, when word reached them from a confidential agent at Kelat that the Emirs of Sindh suspected their presence in the country, and had sent in search of them. Thus the success of the expedition and the personal safety of the explorers depended upon their pushing forward without delay.

We will follow first the journey of Captain Christie. From Nushki he crossed mountains and waste country to the banks of the Helmand, the principal river of Afghanistan, and proceeded thence to a place which he called Elemdar in the district of Seistan. Here he dismissed his Baluchi attendants and changed his disguise to that of a pilgrim. In this character he visited Douchak, a town near the northern end of the Seistan Swamp, thence continuing his pilgrimage to the densely peopled city of Herat, which lies in a well-watered valley among the moun-

tains of the extreme north-west. Here he resumed the rôle of horse-dealer, and after a month's stay continued his journey into Persia, where he visited Yezd before proceeding to Ispahan. He reached the latter city after a journey of 2250 miles in all and was there joined by Lieutenant Pottinger.

The latter officer having likewise changed his disguise, had pursued a course southward to Sarawan, a little village lying west from Kelat and near the Sarawani Mountains, in Baluchistan; had turned aside to cross a portion of the desert south of the Helmand; and had then resumed his journey towards Persia by a route well to the south of the great Haman or Seistan Swamp, and reached Ispahan by a course nearly parallel to the Kohrud Mountains, passing through Benpor (Bampur), Benn (Bam) Kerman and Cheré Bebig (?). His journey had been about 160 miles longer than that of Christie. So well had he impersonated a "pyrzadeh" or holy man, that his guide, who had basked in the sanctity of his presence for two months without the slightest suspicion, was pained and scandalized when at last he revealed himself.

These journeys of Christie and Pottinger threw a great deal of light upon the configuration of Afghanistan and Baluchistan. The latter country is even to this day imperfectly known. That it is a region conspicuous for its extreme range of temperature may be inferred from the fact that Pottinger found such cold at Kelat in February that water poured on the ground

froze instantaneously, while at another point only some 300 miles to the south-east of that city a reading of 125° F. in the shade has been recorded. Although its fauna is poor in species, consisting mainly of lions and leopards of a small type, wild camels, wild asses and wild dogs, Baluchistan is the home of one of the most remarkable animals in the world. This is the Uromastix lizard, which "looks at a distance somewhat like a rabbit in appearance and size, but is really a sort of diminutive saurian called by the Persians buz-miji, or goat-sucker, from its peculiar habit of bleating like a kid to attract the goats, whose teats it then sucks" (A H. Keane). Pottinger describes the inhabitants as belonging to two classes, the Baluchis, related to the modern Persians, and the Brahouis, whose speech was characterized by a great number of Hindustani words. Of these Brahouis he says:—"I have seen no Asiatic people whom they resemble, for a large number have brown hair and beards."

Section 8. The name of Thomas Manning is distinguished as being that of the only Englishman who has ever entered Lhasa, the sacred capital of Tibet. It may be interesting to mention that Manning was a friend of Charles Lamb. Without credentials or official backing, he entered Bhutan by the Lakhi Duar, and in the guise of a physician reached Parijong on the Tibetan frontier. Although all entrances into the country were closed against the inhabitants of India, Manning had the good fortune to meet with

Chinese troops whose general was suffering from some ailment and required his professional services. Being thus attached to the general's staff, he was escorted to Lhasa. He describes Potala, the Palace of the Grand Lama, as a majestic mountain of building, towering above the sacred city. "The road about the palace swarmed with monks; its nooks and angles with beggars lounging and basking in the sun. My eye was almost perpetually fixed on the palace, and roving over its parts, the disposition of which being irregular eluded my attempts at analysis. . . . If the palace had exceeded my expectations, the town as far fell short of them. There is nothing striking, nothing pleasing in its appearance. The inhabitants are begrimed with smut and dirt. The avenues are full of dogs, some growling and gnawing bits of hide, which lie about in profusion and emit a charnel-house smell; others limping and looking livid; others ulcerated; others starved and dying, and pecked at by the ravens; some dead and preyed upon. In short, everything seems mean and gloomy, and excites the idea of something unreal. Even the mirth and laughter of the inhabitants I thought dreamy and ghostly. The dreaminess no doubt was in my own mind, but I never could get rid of the idea; it strengthened upon me afterwards."

He remained for several months in Lhasa, and enjoyed the ineffable privilege of an audience with the Dalai Lama, then a boy of seven, possessed, according to Manning's account, of a strange and impressive

beauty of countenance. The traveller finally returned by the way he had come. The narrative of this adventurous journey was not given to the world until long afterwards, when Sir Clements Markham systematized and edited the story from unpublished material in the possession of Manning's family.

Section 9. In the following year (1812) the East India Company sent an expedition under William Moorcroft and Captain Hearsay into Baltistan, or Little Tibet, an exceedingly alpine region north of Nepal and the North-West Provinces.

Their mission was to "bring back a flock of the famous Kashmir goats, and to settle certain geographical questions in connection with Lake Manasarowar," the most venerated of all the sacred places of the Hindus.

Disguised as Hindu pilgrims, and with a following of twenty-five persons, the travellers began their journey by way of the plains of the Ganges and through Nepal. Their only way of estimating distances was by keeping count of the steps of one of their suite, who had pledged himself to walk in strides of four feet. After crossing the last range of the Himalayas they penetrated to Gartokh and Tirthapuri, the latter a very ancient and holy place, possessing a wall built entirely of stones upon which prayers had been inscribed. They then turned aside to Lake Manasarowar, which lies at the foot of immense sloping prairies, to the south of the great northern chain of the Himalayas. According to Hindu geographers this

lake is the source of the Ganges, the Sutlej, and the Kali.

Moorcroft's explorations showed that this theory could never have been correct as far as the Ganges is concerned, which clearly rises, as stated by Webb and Hodgson, to the south of the first ridge of the Himalayas. He concluded, however, that Manasarowar might have spilled its waters into the head-stream of the Sutlej prior to the great earthquake which disturbed that region in the beginning of the century. At the time of his visit many streams emptied into the lake, but there were none flowing out of it.

Ill and weary the travellers began their return journey. While traversing Nepal a band of Gurkhas suddenly fell upon them, making them prisoners before they had time to offer resistance. It turned out that their disguise had been penetrated, and it is doubtful what their ultimate fate would have been had not one of their goat-herds escaped with letters to the English authorities, who were able to procure their release.

Later (1819-25) Moorcroft, accompanied by G. Trebeck, made important journeys from east to west through interesting and difficult regions to the north of India, visiting Ladak, Kashmir, Peshawur, Kabul, and Bokhara.

Section 10. Until very recently it is probable that no inhabited country appealed to the average imagination with so strong an impression of vastness and remoteness as Siberia. At the beginning of the

century Siberia was almost as unknown, as far as English-speaking people were concerned, as the interior of Africa.

In 1805–7 Heinrich Julius von Klaproth, a Prussian savant, travelled from St. Petersburg to China through Siberia, and returned through the southern districts, collecting many valuable Chinese, Manchurian, Tibetan, and Mongolian documents. His investigations were directed to the races and languages, rather than to the geography of the regions which he traversed. He went among the Samoyedes, Tongouses, Bashkirs, Yakontes, Kirghizes, and many other strange hordes frequenting the great Asian steppes. Klaproth's Siberian travels were followed by explorations among the Caucasus Mountains. The work by which his name is most widely known is his *Asia Polyglotta*.

In 1820-21 an Englishman, Captain John Dundas Cochrane, of the Royal Navy, travelled from St. Petersburg across Siberia to Okhotsk, made an excursion by the Kolyma river to the Frozen Sea, and explored a part of the volcanic peninsula of Kamtchatka. His work was of a pioneer nature, and not particularly rich in scientific results, but the narrative of his journey attracted much attention, and made Siberia and its people better known in England.

CHAPTER XXIII.

ASIATIC EXPLORATION—1825 to 1850.

Section 1. In 1825-26 Eichwald explored the shores of the Caspian Sea, which, with its companion basin of Aral, marks the bottom of the world's most extensive inland drainage system. Although a vast expanse of surrounding country sends all its waters in the direction of these two great inland seas, few of the streams reach their natural destination, most of them running dry in their attempts to traverse thirsty desert tracts. Geological evidence seems to point to a time when these two bodies of water were merged into one wide sea. Even within historical times there have been curious changes in this region, both the Oxus and the Jaxartes having changed their lower course at least once. The former river at one time poured its waters, which now find their way into the Aral Sea, into the Caspian.

When Alexander von Humboldt, in 1829, resumed the rôle of explorer at the age of sixty, and turned his steps to Asia, this great Aralo-Caspian depression in particular attracted his attention. His journey, carried out under the patronage of the Czar of Russia, al-

though covering a vast expanse of country, was too rapid for its scientific results to be very satisfactory. Its field was the Russian empire, especially Western Asia, and the Ural Mountains. With Humboldt were the mineralogist Gustav Rose, the naturalist Ehrenberg, and Baron von Helmerson, an officer of engineers. This distinguished expedition visited the gold and platinum mines of the Urals, explored the Caspian steppes and the Altai range to the frontiers of China, and traversed wide regions of Siberia, but so rapidly did they proceed that in nine months they covered a distance of no less than 11,500 miles. The chief outcome of this journey was Humboldt's great work, *Asie Centrale,* with its brilliant though hasty generalizations. An interesting minor result was the discovery of diamonds in the gold washings of the Ural, which his Brazilian experience enabled him to predict.

Section 2. Asia Minor, Arabia, and the Holy Land continued to attract explorers. In 1829 Lieutenant James Raymond Wellsted, of the Indian Navy, travelled in the Sinai peninsula, and surveyed the adjacent Gulf of Akaba. During 1835-36 he journeyed from the south coast of Arabia inland some seventy miles to the remarkable and unexplored mines of Nakab el Hajar, and accomplished a very important journey, covering 700 miles, in the interior of the province of Oman, the south-eastern part of Arabia. This region had been hitherto wholly unknown to Europeans.

Wellsted says: "Arabia has been aptly compared to a coat of frieze bordered with gold, since the only cultivated or fertile spots are found on its confines, the intermediate space being filled with arid and sandy wastes." His own route, frequently fifty to a hundred miles from the coast, lay sometimes through districts characterized by sandy mounds topped with acacia bushes, sometimes over plains covered with a saline efflorescence, and again among the calcareous ridges, and hills of sand. His explorations were made possible by the friendly attitude of the Imam of Maskat, who gave him safe-conduct among his turbulent subjects. Lieutenant Whitelock, who accompanied Wellsted for the greater part of the way, made a successful excursion across the peninsula which separates the Persian Gulf from the Gulf of Oman, starting from Schinas and reaching Sharja on the famous Pirate Coast.

When questioned by Wellsted as to the origin of the ruins of Nakab el Hajar, the Arabs said that they were very old indeed, the work of their own "pagan ancestors and the devils with whom these were in league."

Two years later (1837) we find the devout Bavarian naturalist, Heinrich Schubert, entering the Holy Land by way of Sinai, a pilgrim whose wanderings were fruitful of geographical results. With Schubert were Dr. Erde and Martin Bernatz. Joining an Arab caravan, the travellers journeyed north through a wide flat valley terminating at the Dead Sea, to He-

bron, by a route not before traversed by a European. Earlier explorers of the Dead Sea, Burckhardt among others, had assumed that it had once poured its waters by this very valley into the Red Sea. Schubert was the first to shatter this theory, by his discovery that the surface of the Dead Sea lay at least 600 feet below that of the Mediterranean.

Close upon the journey of Schubert followed the explorations of Edward Robinson and Eli Smith (1838), two American missionaries whose energy and zeal gave a new impulse to Biblical geography and archæology.

Section 3. The record of explorations now carries us to a country almost immediately east of Palestine. Conspicuous among the many enterprises of an exploratory and scientific nature which have been set on foot by Great Britain is the "Euphrates Expedition" of 1835-37, which included in its field of research the Mesopotamian plains, a region rivalled in wealth of archæological interest only by the Nile valley. The central object of this expedition was the establishment of steam communication with India by way of the Euphrates; but its activity, not limited to the field of commercial geography, bore fruit also in valuable reports on the archæology, geology, and natural history of the country generally.

Under Colonel Chesney and an able staff of officers the expedition, numbering in all nearly a hundred, transported overland to the Euphrates near Bir the various parts of two iron steamers which were there

put together. These formed thenceforth a moving base of operations; from which lateral expeditions were constantly in the field. The results that had been achieved at the end of two years may be briefly catalogued as follows:—Materials for a correct map of much of northern Syria had been collected; a line of levels had been carried from the Mediterranean to the Euphrates; northern Mesopotamia had been explored; a grand survey of the Euphrates had been completed, and the practicability of steam navigation on the river placed beyond doubt. In addition the Karun and the Bahamishir rivers had been partially examined, the remarkable delta region between the Jerahi and Euphrates explored, and a geological exploration of the Taurus Mountains effected.

The Euphrates, like its sister stream the Tigris, rises in the Armenian and Kurdistan highlands in the north, whence by a gradual transition it traverses the Mesopotamian lowlands to the Persian Gulf in the south. There is ample evidence that this arm of the sea once extended much farther inland than now, and it is possible that at one stage in the geological history of the country it connected with the Mediterranean.

The point from which the steamers began their descent was near Urfa, about 1100 miles from the river's mouth. During the survey the expedition occasionally met with active hostility from Arab bands, but for the most part maintained friendly relations with the people of the country. At times shots were

fired, and some blood shed, but the only serious disaster met with was due to no human agency.

Between the Euphrates and the Tigris, stretches a desolate desert tract, overgrown with wormwood, and haunted by the wild ass, the ostrich, and the bustard. Across this region travel sudden and terrible whirlwinds. One of these, accompanied by clouds which "poured their incessant waters upon the darkened earth," struck and sank the steamer "Tigris." "In half an hour the sun shone in unblemished brightness, and the desert wind blew calmly, where she and the greater part of her brave crew had been."

From Bali to the river's mouth the tamarisk is the characteristic plant, while of animals the wild boars, wolves, foxes and jackals abound.

W. J. Ainsworth, a member of this famous expedition, published his special researches on the antiquities of Assyria, Babylonia, and Chaldea; and in 1839-40 continued his explorations in Asia Minor, which he traversed from Skutari in a south-easterly direction to the Persian frontier, covering thousands of miles in his wanderings.

Among other names connected with antiquarian research in these and immediately bordering regions, those of Layard (Syria, 1839 *et seq.*), Sir Charles Fellows (Asia Minor, 1837-44), and Sir Henry Rawlinson specially demand mention. The latter illustrious scholar was engaged in various researches relating to south-western Asia for half a century (1833 *et seq.*). His name is particularly associated with

the decipherment of the cuneiform inscriptions with which the ruins of that region abound, and by which a splendid and previously unknown chapter has been added to the recorded history of the human race.

In 1842 Lieutenant W. B. Selby of the Indian Navy, who had already taken part in the work of the Euphrates Expedition, ascended and surveyed the Karun river as far as the town of Shusters. This river which flows from the mountains of western Persia into the head of the Persian Gulf, had been examined in its lower course by the earlier expedition as far as the supposedly impassable Bund of Ahwaz. The ancient "bund" or dam is built where a ridge of sandstone hills crosses the river, and through the only break in the masonry the water rushes with terrific force. By steaming and warping, however, Selby passed this barrier with the steam-vessel "Assyria," and explored the unknown upper river to Shusters. He found the banks well-wooded in the lower course, but on the upper reaches desolate, though once supporting immense date groves.

The source of the Karun is in the Kuh-i-Zard, or yellow mountain, near Ispahan. He also explored an affluent, the Dizful river, and his report "remained for forty years our only source of information on this important district."

Before passing to the countries immediately west and north of India, it is necessary to mention Captain William Allen's survey of the Dead Sea, and his startling suggestion for opening a new route to the

East. He pointed out that the Dead Sea lies at the middle and lowest point of a long valley running north and south almost the length of Palestine, and bounded by high hills on the east and west; and that nearly the whole extent of this valley lies at a lower level than the surface of the Mediterranean. His idea was that a canal should be cut from the mouth of the river Kishon, near Mount Carmel, to the channel of the Jordan, about twenty miles south of the Sea of Galilee, and another northward from the Gulf of Akaba to the Wady Arabah, thus flooding the entire valley and connecting the Mediterranean with the Red Sea. Of the 2000 square miles of country which would thus be submerged, he argued that the bulk was desert and useless.

Allen's measurement of the depression of the Dead Sea below the Mediterranean made the difference over 1200 feet—more than twice Schubert's estimate.

Section 4. Turning our attention farther east, we find Western Turkestan and Afghanistan, during the quarter century under consideration, the scene of many adventurous journeys and explorations. Some of these we will speak of briefly, and more or less collectively, here; while those of Burnes and Wood, owing to the greater importance of their results from a geographical point of view, will be described each in a separate section. This necessitates a slight departure from a strictly chronological sequence of narration, but this, being pointed out, need cause no confusion.

Between 1826 and 1838 Charles Masson travelled rather extensively in Afghanistan and Baluchistan; and in 1827 Mr. Stirling, of the Bengal Civil Service, crossed the little-known Hazarah Mountains, in the north of Afghanistan. Of interest also is the long overland journey of Lieutenant Conolly through Russia, Persia and Afghanistan to northern India (1829-30). From Tabriz in the north-west of Persia his route was east and south, passing through the towns of Mashad and Herat. By a side excursion he attempted to reach Khiva in Turkestan, but had to turn back after penetrating for several days the salt waste of the Kara Kum desert. Here he saw a few antelopes, great numbers of desert rats, and some brilliantly-coloured paroquets. He speaks of the desolate scene presented by the Kara Kum, or "black sands," but adds that "there was great beauty in it in the stillness of broad twilight." Conolly travelled in the guise of a Mohammedan merchant, but was without instruments of survey. His book treats of the people rather than the geography of the countries traversed.

In 1839 Lieutenant James Sutherland Broadfoot, with the British arms in Afghanistan, carried out explorations of some importance. After the storm and capture of Ghazni he travelled with Outram's force through the unknown country of the Ghilzis, surveying, fighting, and collecting various information. He then explored a route through the south-east of Afghanistan from Ghazni to Dera Ismail Khan, on the Indus. To do this he joined a caravan, and in the

guise of a merchant traversed the valleys of the Ghazni and Gomal rivers, crossing the Suliman Mountains by the Ghwalari pass. This route had remained unknown to Europeans owing to its physical difficulties and the wildness of its inhabitants. Broadfoot says: "I made agreement with the natives, put on their dress, and went among a set of murderers unharmed, because a guest, although one hundred of the men of my party were killed one night. . . . . For twenty days I passed through a range of tremendous mountains, without a horse, a dog, a cow, or any sign of life except the nightly plunderers who waited to surprise the caravan."

In 1839-40 Captain James Abbott, Bengal Artillery, travelled from Herat on a mission to the court of Khiva, whence he proceeded to Russia. From Merv his way was through the desert. Here the weather was chilly, with hoar frost, and, when the wind blew from the Caspian, snow. He says: "The aspect of the desert, or rather wilderness, from Merv to Khiva, is that of a sandy plain broken into the most irregular surface by deep pits and high mounds, the whole thinly sprinkled with bushes of three several kinds, between which grow wormwood and the camel-thorn. On approaching Khiva, the surface is often ploughed into ravines and ridges, whose course is north and south, and traditionally reported to be old courses of the Oxus." The water of the wells, which are found only at long intervals, is generally brackish.

On the route from Khiva to Russia, Abbott was at-

tacked and severely wounded by Cossack robbers on the shores of the Caspian Sea.

A few years later (1842-43) occurred the visit of Colonel Stoddart and Captain Conolly to Bokhara, made memorable by the tragic fate of the travellers. In 1844-45 the Rev. Joseph Wolff journeyed to the court of the Ameer to seek tidings of these officers. He learned at last that they had been imprisoned in the capital, subjected to extreme cruelty, and finally murdered. Wolff's account of his mission contained geographical information concerning the country.

Section 5. Meanwhile, some ten or twelve years before the murder of Stoddart and Conolly, Lieutenant (afterwards Sir) Alexander Burnes had accomplished his memorable journey from India through Cabul to Bokhara.

In 1831 he was selected to convey presents from the King of Great Britain to the Maharaja of the Panjab at Lahore, in the course of which mission he ascended the Indus and its affluent the Ravi by ship, a voyage not before accomplished by any modern traveller. The following year he undertook the more difficult and delicate task of carrying his explorations through Cabul and Bokhara. It was not advisable that he should go as an accredited agent of the British Government, owing to the jealous and suspicious attitude of the rulers whose states he must traverse. At the same time, while he adopted the costume of an oriental, he felt so little confident of his ability to successfully sustain a disguise for so long a time that he

decided to acknowledge himself a European on his way overland to Europe, except in the more fanatical parts of Turkestan, where such an admission would inevitably incur disaster.

Burnes's companions in this adventure were Mr. James Gerard, a surgeon of the Bengal Army, Mohammed Ali, a native surveyor, and a Hindu lad.

From Delhi the travellers reached Lahore, and maintaining a north-westerly direction past Rawal Pindi, forded with difficulty the torrential upper stream of the Indus. From this point onward they adopted Asiatic dress, shaved their heads, ate with the fingers, and in every way conformed outwardly to the customs of the people. Three miles beyond the Indus they entered Afghanistan, joined a band of Khultuks with whom they proceeded to Acora, and thence to Peshawur, where they were received with extreme friendliness by the Khan. From Peshawur their route crossed the mountains to the city of Cabul by way of the valley of the Cabul river, which here breaks its way through the barrier to join the Indus. When at times it was necessary to cross the river this was effected with the help of inflated skins. After some months spent in the capital Burnes and his companions left Cabul, followed the river of that name to its source at Sirchushma and crossed the snowy Koh-i-Baba Mountains (an extension of the Hindu Kush), and a wide expanse of Alpine country beyond, into Turkestan. Here they found it necessary to pass as poor Armenian pilgrims. While fol-

lowing the bed of the Khulum river, along a path bounded by terrific precipices, they saw a caravan attacked, and its members carried off to slavery by a band of Tartar robbers; while it was by a very narrow margin that Burnes escaped the same fate.

Burnes speaks of the frequency of occurrence, and the exuberant growth, of the assafœtida plant in this mountainous region. This plant, in spite of the ill-odour of its name, is eaten with relish by the natives.

At Kunduz, in the Oxus valley, an Uzbek chief regarded the travellers with suspicion, and they endured a critical and trying period of suspense before they were allowed to proceed. The next point of interest reached was the ancient city of Balkh, then belonging to the kingdom of Bokhara. The ruins of this place, which after the conquest of Alexander was known as Bactria, extend for a circuit of about twenty miles. From Balkh their course lay across a wilderness to the Oxus, beyond which river the country became even more desolate. For eighty-five miles to the oasis of Kurshee the only representatives of animal life met with were tortoises, lizards and ants.

At the city of Bokhara, the stronghold of Islamism, they were well received by the Vizier, and allowed to wander at large without much restriction. They were particularly struck with the slave market, a most flourishing institution in the centre of piety despite the law of the Prophet. The expedition had managed to conceal about their persons a few instruments which would suffice for a running survey,

but these could only be used in secret. No opportunity was lost, however, to take observations and to fix localities *en route.*

From Bokhara they travelled south and west across the desert of KaraKum, inhabited by nomadic Turkoman tribes, to the Persian province of Khorasan. The remainder of their overland journey lay through Persia to the coast, on the Persian Gulf, where they took ship for India.

Section 6. The name of Lieutenant John Wood takes place among those of eminent explorers as the first to trace the Oxus to one of its chief sources, and the first European of modern times to reach the famous region called Bam-i-Duniah, or "roof of the world."

Attached to Sir Alexander Burnes's second mission to Cabul (1836-38), Lieutenant Wood explored the upper course of the Indus, and its tributary, the Cabul river; he then continued his explorations from Cabul to the table-land of Pamir, when he discovered the lake now variously known as Sirikol, Victoria, and Sikandari, from which flows the northern and more elevated of the two head streams of the Oxus.

Following his line of march from Cabul, we find that he traversed much the same ground as Burnes had covered as far as Kunduz, a town of the Uzbeks. Having after some delay and difficulty obtained permission from the chief of this town to trace the course of the upper Oxus, he proceeded to the village of Kila Afghan. Thence he reached Fyzabad on the Kokcha

river, a tributary of the Oxus, on whose banks are quarries of Lapis Lazuli. After following the valley of the Kokcha for some distance he crossed to the Oxus which he reached at a point above its ancient ruby mines. His course now followed this river to Issar, "where the valley of the Oxus may be said to terminate." At this place which is 10,000 feet above the sea, the river forks. Of the two branch streams Wood chose the northern one for exploration, both because the native Kirghiz said it was the main stream, and because he found the water which it brought down five degrees colder than that of the southern affluent, from which he inferred that it flowed from a greater elevation.

His journey now lay through a narrow rough valley, deep in snow, but before the second day from the forks had passed he found the stream frozen firmly enough to serve as a highway. A fire was possible only when he had the good fortune to discover a site of a Kirghiz summer encampment, where the collection of dried camel's dung which his native guides dug from under the snow made excellent fuel. A few days of this cheerless journey brought its reward when he found himself on that part of the Pamir called Bam-i-Duniah, and saw Lake Sirikol at his feet. Wood describes the spot as follows:—"This fine lake lies in the form of a crescent, about fourteen miles long from east to west, by an average breadth of one mile. On three sides it is bordered by swelling hills, about five hundred feet high, whilst along

its northern bank they rise into mountains 3,500 feet above the lake, or 19,000 feet above the sea, and are covered with perpetual snow, from which never-failing source the lake is supplied. . . . . This then is the position of the sources of this celebrated river, which after a course of upwards of 1,000 miles in a direction generally north-west falls into the sea of Aral. . . . . The aspect of the landscape was wintry in the extreme. Wherever the eye fell one dazzling sheet of snow carpeted the ground, while the sky overhead was everywhere of a dark and angry hue. Clouds would have been a relief to the eye; but they were wanting. Not a breath moved along the frozen surface of the lake; not a beast, or even a bird, was visible."

It was the winter of 1838 when Wood thus achieved the goal of his exertions. His narrative gives an insight into the life and habits of the Kirghiz, a stunted and weather-beaten people of Mongolian stock, who shift their hair tents periodically between the highest lands in the summer and the lower valleys in the winter. Their home is in the high steppes of Central Asia. The yak serves them as beast of burden, supplies them with milk and with means of protection from the weather, and is on the whole almost as essential to their welfare as the reindeer is to the Laplanders. In the summer these yaks, or kash-gows, follow the receding cold upwards to the "old ice," or region of perpetual snow.

Section 7. Between 1847-50 Dr. (afterwards

Sir Joseph) Hooker studied the flora of the Ganges valley and by way of Sikkim explored unknown regions among the higher Himalayas, his work constituting, according to Sir Clements R. Markham, "the most valuable contribution of any private traveller to Himalayan geography."

About the same time (1848) Dr. Thomas Thomson explored the Karakorum Pass, and afterwards joined Dr. Hooker in his researches among the Khasia Mountains. We will first follow the travels of the great botanist from the time when, after leaving Darjiling, his explorations assumed a geographical as well as a botanical importance.

From Darjiling Dr. Hooker's first excursion (1848) led him to the valley of the Tambur, a tributary of the Cosi river, in Eastern Nepal. Following this valley, and that of the affluent Yangma, he reached the passes of Wallanchun, Yangmachen and Kambachen, hitherto unknown to Europeans. Of the outlook from Tonglo hill, above the Tambur valley, his pen gives us this glimpse:—"Kanchan-junga was nearly due north—a dazzling mass of snowy peaks intersected by the glaciers which gleamed in the slanting rays of the rising sun, like aquamarines set in frosted silver. To the east was a billowy mass of forest-clad mountains."

He next entered the little-known principality of Sikkim, where he was for some time detained as a hostage by the Rajah, who hoped thus to force a more favourable treaty with the Indian Government. He

was not prevented from exploring the country, however. By the villages of the Tista and its feeders the Lachen and Lachung he reached the Kongra-Lama and Donkia passes, where again he had the distinction of being the first European to set foot. He did not stop here, but followed the Lachen into Tibet as far as its source, the small lake of Cholamú, 17,000 feet above the sea. From this place, the view of the Central range of the Himalayas was magnificent.

Hooker's topographical survey of Sikkim resulted in the only map of the country.

Meanwhile Dr. Thomson, by a journey of two months in the north-west Himalayas and Tibet, had reached the lofty Karakorum Pass between Ladak and Yarkand. His route was from Leh across the Sassar Pass, over the ice and moraines of an immense glacier, to the valley of the Shazok river; thence for days through ravines and gravelly valleys until he reached a wide and desolate plain, extending eight or ten miles, and lying at an elevation of about 18,000 feet. After crossing this plain he followed another stony valley to the top of the Karakorum Pass (18,604 feet), whence he retraced his steps.

As these two explorers have brought us to the southern border of Tibet, we may here refer to MM. Huc and Gabet, the only Europeans to traverse any considerable portion of that country during the quarter-century under consideration, and the first since Manning to gain entrance into Lhasa. These adventurous French missionaries entered Tibet from

China (1844-45) and reached, after eighteen months of long marches and terrible hardships, the city of the Dalai Lama, whence after a month's residence they were sent back by way of Szechuen.

Section 8. Turning to the record of Russian geographical work in Siberia, we find that the journey of Middendorf in the far north (1843) and the explorations of Butakoff in the extreme south (1848-49) are of special interest.

M. Middendorf, under the auspices of the Academy of Sciences at St. Petersburg, undertook the exploration of an unknown region lying to the east of the Yenisei between the Lower Tunguska and the Arctic Ocean. As one of the chief objects of the expedition was to study the flora of this outland region, it was necessary to traverse the greater part of the route during the summer, a season when the difficulties of transport over the *tûndra* country are greatly increased.

In March (1843) Middendorf's party began their journey with sledges and reindeer, passing from camp to camp of the nomadic Samoyedes. Joining a band of these natives in their northward migration, the expedition reached the Taimyr river, at a point on its upper course. Here they put together a rough boat, from materials brought with them by sledge, and late in June began their voyage down stream towards the Arctic coast. They soon passed beyond the most northern district ever visited by the Samoyedes, and in the middle of August reached the sea. But

already the brief Arctic summer was expiring, and ice forming on the river at night, making it imperative for them to hasten their return.

It was now that their difficulties began in earnest, the men being weak and exhausted, and their progress a constant struggle against a fierce current. Before reaching a depôt of buried provisions upon which they relied, the boat was crushed by the ice, and sank. After sleeping in the snow for nights without tent or shelter, and enduring the first stages of starvation, the explorers were saved by a party of Samoyedes who had come in search of them.

From the frozen desolation of the Taimyr peninsula the explorations of Commander Alexey Butakoff, of the Imperial Russian Navy take us into another lonely but incomparably less forbidding waste, the sandy region in which lies the Sea of Aral.

Butakoff built a flat-bottomed exploring ship for the purpose, and during 1848-49 carried out a complete survey of this vast lake, which had been previously laid down on the maps "only from superficial and partial information derived from the native Kirghiz." In the course of this survey he discovered a group of islands, the existence of which was entirely unknown even to the Kirghiz. These he named the "Islands of the Czar."

CHAPTER XXIV.

ASIATIC EXPLORATION—1850 to 1875.

Section 1. Although that extension of Asia west and south of Persia had already received much attention, the dawn of the second half of the century found our knowledge of the regions therein comprised far from complete. Specially was this true of the interior of Arabia, whose secrets desert and Bedouins had combined to guard.

In 1853 Lieutenant (afterwards Sir) Richard Francis Burton travelled in the character of an Afghan pilgrim to Medina and thence to Mecca. The route from Yambu on the coast to Medina had been traversed by Burckhardt when too ill to observe or describe closely, so that Burton's description is of value. His third day's march was through a region of fantastic desolation which he puts before us in vigorous phrase:—"Like the astronomer's moon, it was a world of naked hills, desert valleys, and barren plains. Vast clefts seamed as scars the haggard face of earth; here they widened into black ravines; there they narrowed to mere lines white with glistening drift-sand. A sky like polished steel rested upon

one horizon; on the other, a tremendous blaze of yellow light, untempered by the thinnest thread of mist."

From Medina to Mecca Burton followed the eastern route which crossed a part of the Nejd Desert, and was only used when the robber bands closed the coast road. His journey lay for twelve days through country unknown to Europeans. The large caravan of pilgrims to which he had attached himself travelled much by night to spare the camels during the terrible heat of the day. Their progression was a picturesque one, by moonlight and starlight over the rugged desert upland. Burton describes this part of the country as a succession of irregularly oblong plains, cut by nullahs or dry channels, and divided by belts of basalt and greenstone. Low but abrupt hills surround these plains. He says: "Nowhere have I seen a land richer in volcanic and primary formations, or one where earth's anatomy is laid so bare." Of the sixth day from Medina Burton writes:—"This day's march was peculiarly Arabic—'a Sahara la Siwahu,' as my companions called it, 'a desert where is no living thing but Allah.' The horizon was a sea of mirage, and fantastic streams gushed over every descent. Gigantic columns of sand whirled about the plain, and on both sides of our road were piles of bare rock standing detached upon the surface of sand and clay."

In 1862-63 W. Gifford Palgrave made one of the most interesting and extensive journeys that had yet been accomplished in that difficult country. Dis-

guised as an Arab physician he crossed the Arabian peninsula from Gaza to Maskat, thus traversing it at its greatest breadth. Unfortunately he was unable to take with him any mathematical or geodetical instruments. Notwithstanding this his work filled in many blanks in our view of Arabia, in addition to its most striking result, the revelation of the true state of the interior.

It will be remembered that travellers who had pushed their investigations inland from the strikingly —and exceptionally—fertile coasts of Yemen, Aman, and Hasa had described Arabia as "a coat of frieze bordered with gold." By the light of Palgrave's journey this conception must be somewhat modified. That traveller after crossing a desolate and waste tract, reached an inland region "whose valleys are well watered, and whose steppes are far from arid," a region of well-built and fortified towns, occupied by a happy and settled people, and fondly celebrated in Arab song. He found that the "horrid depths" suggested by Burton existed not in the actual interior, but in a vast encircling desert belt, which enclosed on all sides a central area full of towns and villages, of life and habitation. He describes this girdle of desert as narrowing in some places to a breadth of only fifty or sixty miles, but expanding elsewhere to a great width, especially in the north and south. Outside of the desert again is a surrounding chain of mountains, "varying in character, but generally low, stony and barren."

Palgrave distinguishes also between the deserts of the north and the south, whose enclosing arms extend and meet on either side of the habitable interior. The northern waste he describes as "deserted" rather than desert, having a rocky soil capable of supporting vegetation, and much water below the surface, obtainable by sinking wells. The terrible desert of the south, on the other hand, called by the Arabs "Dahna" or Fire-red, he describes as an expanse of burning sands, a region of "hopeless irremediable sterility and desolation."

The natural inaccessibility of the desert-guarded interior is increased by the bands of Bedouin Arabs, predatory wandering herdsmen who scour its encircling wastes.

Before passing on to a series of explorations having India as their base, mention should be made of the work organized by the Palestine Exploration Fund (1865 *et seq.*) as well as of the researches of Burton and Tyrwhitt Drake in Syria (1872).

Section 2. Meanwhile the triangulation of India, already referred to, had been going steadily forward in all parts of that great territory, under the guidance of able and zealous officers. Northward the great survey had extended its field far into the difficult Himalayan region, fixing the position and height of many of the mightiest peaks, among them Mount Everest, the highest known mountain in the world.

During the period from 1855 to 1861 Colonel T. G. Montgomerie, under the direction of Sir Andrew

Scott Waugh, carried the triangulation into Kashmir, while at the same time this work was supplemented by Colonel H. H. Godwin-Austen's topographical survey. Kashmir, as a glance at the map will show, is an exceedingly mountainous country, and much of the instrumental work had to be done at great altitudes. Sometimes the upper level of the clouds would fall below the camp, so that the surveyors looked out over a sea of clouds from which the peaks of the various ranges stood out like islands. In several cases observations were taken from stations more than 19,000 feet above the sea. Across the desolate and elevated plains of Deosai Colonel Montgomerie took his first observation to the giant peak of the Karakorum range known as "K 2," whose height of 28,287 feet is surpassed only by Mount Everest.

One of the most striking topographical features of this region is the great amount of glaciation, especially in the neighbourhood of the Upper Indus valley, and in the Karakorum range. Colonel Godwin-Austen and Lieutenant Melville explored more than 300 square miles of glaciers, most of these of huge mass and extent.

While exploring the Mustagh region Colonel Austen witnessed a curious phenomenon. The camp had been pitched in a large ravine, at an elevation of about 12,500 feet, when its occupants were disturbed by a peculiar rumbling sound and a few seconds afterwards saw a black mass coming out of a lateral ravine from the right, and moving rapidly over the

broad slope which formed the bed of the valley. This proved to be a great stream of thick mud and boulders, which swept along with a breadth of about 30 yards and a depth of some 15 feet. "It was a most wonderful sight; a great moving mass of stones and rocks, some of great size—as much as 10 feet by 6 feet—all travelling along together like peas shot out of a bag, rumbling and tumbling one over another and causing the ground to shake."

Section 3. The name of Colonel T. G. Montgomerie is also connected with an interesting and novel phase of geographical exploration. He put into practice the plan of training native explorers in the use of surveying instruments, and sent them into parts of Central Asia inaccessible to Europeans. A touch of romance is given to their work by the fact that while its results attracted the attention of geographers the world over, the names of the explorers were kept a secret—a precaution necessary both for their own safety and for the continuance of their usefulness in the same field.

One of these, a young Brahmin known in the records of the Indian Survey as the 1st Pundit, made his way in 1865-66 from India through Nepal to Lhasa, whence he followed the Upper Brahmaputra westward to its source among great glaciers near the Manasarowar Lake, and crossed the Himalayas again to the plains of India.

The result of this journey was a route-survey of some 800 miles of practically unknown country,

checked by many astronomical observations, and supplemented by topographical notes. The Pundit's ostensible object in entering Tibet was trade. The boxes containing his merchandise were fitted with carefully devised false bottoms, beneath which were hidden the larger instruments. Distance was measured by counting paces, and tally kept with the help of a rosary, one bead of which was dropped for every hundred steps. Slips of paper, with notes and records, were concealed in the cylinder of a small prayer-wheel, such as the Tibetans carry in the hand, and the officials revere too much to examine.

The Pundit's account of Lhasa agrees in the main with the rare descriptions of that extraordinary capital which had already been given to the world. He saw the Dalai Lama, whom he describes as "a fair and handsome boy of thirteen years of age." It will be remembered that the Grand Lama seen by Manning (1811) was also "a beautiful boy" of even slenderer years, while M. Huc in 1846 found that sacred personage then a boy of nine.

The Pundit also described navigation on the Brahmaputra (known on its upper course as the Sanpo) as much as 80 miles above Lhasa, at a height of 13,500 feet above the sea, an altitude at which no other river in any part of the world is navigated. Another unique topographical feature concerning which geographers had been inclined to doubt earlier evidence, was lake Yandokcho, south of Lhasa, whose wide basin was practically filled by a supposed island, a

mass of rounded and grassy hills with an area altogether without precedent in relation to the size of the lake itself. The Pundit's evidence, as far as it went, supported the theory of an actual island, but unfortunately was not conclusive, as he failed to make a complete circuit of the basin.

While this important exploration was in progress the 2nd Pundit, a brother of the 1st, had visited the town of Gartok, in Western Tibet, and returned by a different route, connecting that place with points in British territory already fixed by the Great Survey.

In 1867 Colonel Montgomerie despatched the same two Pundits, together with a third, to make still farther explorations in the great table-land of Tibet. This time their mission was to settle various doubtful points as to the position of the upper basin of the Sutlej; to determine or disprove the existence of the rumoured eastern branch of the Indus, to connect Gartok with the regular survey in Ladak, to explore the gold and salt mines said to exist east of Gartok, and, if possible, to push still eastward into the great *terra incognita* between the desert of Gobi and Lhasa. This programme was successfully carried out, with the exception of the last item. The eastern branch of the Indus was found to be not only no myth, but the longer of the two branches. It is known to the natives as Singh-gi-Khamba, or "Lion's Mouth."

Some picturesque features of the journey may be briefly described. Entering Tibet in the neighbourhood of Gartok, disguised as Bisáhiri traders, they

reached a vast plateau, 15,280 feet above the sea, called Chojothol, or "Antelope Plain." Throughout this journey they noted that "in spite of the desolate aspect of the mountains traversed, the number of wild animals was remarkable,—quantities of Tibetan antelopes, wild asses, yaks, grey wolves, hares and marmots." In addition to this the small lakes swarmed with wild-fowl. After crossing this plateau, five or six marches eastward brought the Pundits to the chief gold-field. The camp lay in a large desolate reddish-brown plain, and so bitter was the wind that the diggers' yak-hair tents were pitched for warmth in pits seven or eight feet below the surface of the ground. Here the Pundits exchanged coral for gold. They describe as follows the extraordinary position in which Tibetans sleep:—"They invariably draw their knees close up to their heads, and rest on their knees and elbows, huddling every scrap of clothing they can muster on their backs. . . . . Rich and poor adopt the same position." North of the gold-fields the country was uninhabited, and its character unknown to the diggers.

In 1871 another of Montgomerie's native explorers crossed a pass in Eastern Nepal already described by Dr. Hooker, reached the Arun river, a tributary of the Kosi, and after traversing two more passes discovered a large lake, measuring some 20 miles by 16, in the borderland between Sikkim and Tibet. He then crossed the inner Himalayan range to Shigatze, the seat of the Teshu Lama, and returned to Nepal

after crossing the great plain called Dingri-maidan.

In the same year another explorer, a trained native of Tibet, was sent to investigate the unknown region in his own country north of the upper Brahmaputra. As beasts of burden he took fifty native sheep, the only animals capable of enduring the cold and the rocky ground. Leaving Shigatze in November, 1871, he reached the Ninjinthangla Mountains in January, 1872. In this range he discovered numerous hot-springs, whose steaming waters afforded a curious contrast to the general frozen solitude. He also describes two great jets of hot water, resembling the geysers of Iceland, and reaching a height of more than 60 feet. "The water, in falling again, freezes, and forms pillars of ice up to the full height of the jets. These pillars are 30 feet in circumference, and the water within them, which is thrown up with great noise and violence, stood at a temperature of 183°."

Beyond these mountains he reached the great lake called by the Chinese Tengri-nor, but known to the Tibetans as Namcho, or "Sky Lake." This wide expanse of brackish water (50 miles by 35 miles) lies far from all inhabited districts, at a height of 15,500 feet above the sea. It has no outlet, and was frozen over when visited by this explorer. While trying to penetrate the unknown lands north of the lake he was attacked and stripped of all his possessions by a band of 60 mounted robbers. He then struggled southward to Lhasa, and thence to India, which he reached after

great hardships. His route-survey covered 320 miles of entirely unknown country.

Section 4. After the great Mohammedan revolt, when the Chinese were driven from eastern Turkestan, the Indian Government made efforts to establish commercial relations with the latter country. As a result Mr. R. B. Shaw, a British tea-planter from Kangra was able in 1868 to traverse all the lofty mountain passes north of Leh in Ladak and to carry his caravan of merchandise into the Yarkand territory. He entered the city of Yarkand early in December, some ten days before Mr. G. W. Hayward, a British explorer under the auspices of the Royal Geographical Society.

Shaw was the first European of modern times, with the exception of a Russian captive at the close of the 18th century, to penetrate to Yarkand and return in safety. In 1857 Adolph Schlagintweit had pushed northward through Yarkand to Kashgar, where, after coming safely through many dangers, he was robbed and murdered.

Mr. G. W. Hayward, also starting from Leh, explored the Karakash river, near the Kashmir-Turkestan frontier, and discovered the sources of the Yarkand river among glaciers of the Karakorum Mountains. He then proceeded to Yarkand, a city surrounded by seven miles of massive bastioned wall more than 40 feet high. For the rest his first impression was a confused mass of mud houses, with a few mosques rising above the general level. While

here he was not allowed to meet Shaw, the presence of two Englishmen in the country at the same time having awakened numberless suspicions in the oriental mind. Finally he was escorted to Kashgar, but allowed to proceed no farther. Returning to India he attempted to reach the Pamir steppe by another route, but was murdered by a Gilgit chief. Hayward was the first traveller to venture into these dangerous regions in the acknowledged character of a private explorer.

In 1873-74 a mission under Sir Douglas Forsyth proceeded to Yarkand and Kashgar, accompanied by Colonel H. Trotter as geographer. The latter made excursions westward into the Little Pamir, where he explored the lake from which the southern branch of the Oxus flows. He also visited the other source of the Oxus in the Great Pamir, but was not able to complete the exploration of this interesting region. His work, however, threw much light upon what geographers then considered the great problem of Central Asian geography. Karl Ritter had spoken of the Pamir Plateau as "the most remarkable point of the whole world as regards the history of humanity."

Section 5. The Russians meanwhile had been steadily pushing their explorations from the north. In 1856 P. Semenoff, a distinguished savant, accompanied a military expedition from Fort Vernoye to the western shore of Lake Issik-kul, north of Eastern Turkestan, by way of the Chui valley. The Buam Pass, in this valley "astonishes the traveller by its

wild magnificence." In 1857 Semenoff reached the summit of the Zaukin Pass, north of Lake Issik-kul, whence he saw the sources of the Naryn.

Russian explorers now advanced rapidly southward into the Thian Shan Mountains. In 1858 Valikanoff crossed this range and made his way southward to Kashgar. A few years later Captain Protsenko carried a survey from Lake Issik-kul to the Naryn river, while an expedition under Poltoratsky in 1867 continued the survey southward from the Naryn along the route to Kashgar. Three years earlier N. Severtsof, while surveying the western portion of the Thian Shan, or Celestial Range, had discovered coal fields and a series of beds of gold dust by the affluents of the Tersa river. Other officers surveyed the so-called Starved Steppe, whose arid expanse was once enriched by the waters of the Zerafshan.

But the most extensive and difficult journeys performed by any Russian traveller of this period were those of Colonel N. Prejevalsky during 1872 and 1873, in Eastern High Asia. Starting from Kalgan, in northern China, he made two excursions towards the north and east in 1871. In the following year, from the same base, he began the journey which was to win him fame as an explorer. For a month he accompanied a Chinese caravan, but left this to explore the mountains bordering the Tatung river. The country was still in a ferment from the Mohammedan rebellion. From the Lama monastery of Chabsen he crossed a region infested with Tungani insurgents,

and reached the thickly-settled shores of the Koko-nor. Here he bought camels and pushed on over a high range of mountains into the region of Tsaidam, which he describes as a vast salt-marsh covered with reeds.

The natives told him that this marshy hollow stretched west and north to the mysterious Lob-nor. From Tsaidam he reached the lofty solitudes of Northern Tibet, a bleak and vast region without human inhabitants, but frequented by an almost incredible number of large mammals, of which the most typical is the wild yak. This Tibetan waste has an elevation of from 14,000 to 15,000 feet, and extends from north to south for a distance of some 500 miles. Here he saw the upper stream of the great Yang-tse-Kiang. He had reached to within a month's journey of Lhasa when the condition of his camels and the state of his funds compelled his return to China.

The following year (1873) he made the direct route from Alashan across the desert of Gobi to Urga, whence he reached Russia. This route had never before been attempted by a European. Of that depressed basin in the great desert south of the Churru range, called the Galbun Gobi, Prejevalsky writes: "This desert is so terrible that in comparison with it the deserts of Northern Tibet may be called fruitful. There, at all events, you may often find water and good pasture land in the valleys; here there is neither the one nor the other, not even a single oasis; everywhere the silence of the Valley of Death."

Section 6. When Admiral Hope's squadron as-

cended the Yang-tse-Kiang in 1862 to Hankow, Captain Thomas W. Blakiston led a private expedition to continue the ascent of that river and, if possible, reach India through Tibet. The party, consisting of four Europeans, four Sikhs, and four Chinese, began the journey in a native junk from Hankow. At I-chang, a thousand miles from the sea, they entered upon a section of the river distinguished by magnificent gorges and impetuous rapids, which prevailed for over 100 miles. Of one of these gorges, Blakiston says: "As we entered, the gloom was very impressive; huge walls of rock rose vertically on either side to a prodigious height, with great table-shaped slabs standing out from the face of the cliff, from which hung long pointed stalactites; and on the upper surfaces of some were trees, whose roots drooped in festoons from their edges." At Ping-shan, in the midst of the mountains, the expedition was brought to a standstill by the Taiping rebels, and from this point, some 1800 miles from the river's mouth, it had ultimately to turn back.

It had accomplished, however, the exploration and survey of 900 miles of the upper Yang-tse-Kiang, through a country where, with the exception of a few Roman Catholic missionaries disguised as natives, no European had ever penetrated.

Section 7. In 1866-68 an expedition under Captain Doudard de la Grée and Lieutenant Francis Garnier, officers of the French Navy, explored and surveyed the Mekong, or Cambodia river, from its

mouth in French Cochin China, explored the southern Chinese province of Yunnan, and thence descended the Yang-tse-Kiang to Shanghai. Captain la Grée died before the completion of this journey, but Lieutenant Garnier carried it to a successful issue.

Some 280 miles from its mouth the Mekong traverses, in a long succession of rapids, a scarcely inhabited region of splendid forest. Another 125 miles brought the explorers to cataracts 50 feet high, beyond which the river narrowed between mountains. After a region of level country the river again took them among mountains, which probably continued to its remote source. From Kiang-tung, on the Mekong, the expedition struck northward through Yunnan to the city of Yunanfu, which it reached in December, 1867. Garnier entered Talifu, the rebel capital, and determined its position. After many perils and adventures he brought the survivors of the expedition to Sucheufu, on the navigable Yang-tse where their difficulties ended. By the middle of June, 1868, they reached Shanghai.

This was one of the most interesting and successful geographical explorations of the century, its results being "not only the development of the true physical geography of vast tracts hitherto undescribed, but also the accumulation of knowledge relating to philology, antiquities, zoology, botany, and geology." Of the entire journey of over 6000 miles, 2480 miles were travelled on foot, while over 4000 miles of route-sur-

veys were accomplished, and corrected by 58 astronomical determinations.

About the same time (1868) Major E. R. Sladen explored the country between Bhamo in Burma and Momien in south-west China. From Mandalay, the royal capital of Burma, he ascended the Irawadi to Bhamo, 300 miles above Mandalay, and 900 from the river's mouth. The upper course of this river of Burma affords scenes of marvellous and ever-varying beauty. From Bhamo Sladen journeyed overland in a north-westerly direction across the Kachyen Hills, through a forbidden and unexplored region. These hills are an irregular transverse range with an average breadth of 50 to 70 miles. Passing through the Kachyen and Shan tribes, he found himself among the Mohammedan Chinese of Yunnan. Reaching the moated battlements of Momien, Sladen was received well by the Governor, and allowed to return to Bhamo by a different route. The object of this expedition was to open a trade route between China and Burma.

Section 8. In the same year (1868) Ney Elias, an English traveller, explored and surveyed the new course of the Hoang-ho, or Yellow River.

From Shanghai he ascended the Yang-tse to Chin-Kiang, on the Imperial Canal, which he navigated for 400 miles to where the Yellow River, in its new course, spread laterally over 10 or 15 miles of low country. This river he descended to its mouth, and as-

cended again to its point of departure from the old bed.

This new course is 413 miles in length, and reaches the sea at the Gulf of Pechili, some 250 miles north of the former mouth, which gave on the Yellow Sea. This is the story of the change of course, as gathered by Elias from the natives: "During the summer flood of 1851 the first rupture took place in the north banks near Lan-Yan-Hein in Honan, and a portion of the water flowed through the breach into the plain; the flood of 1852 extended the breach and further diminished the supply on the lower river; and that of 1853 enlarged it to such an extent as to allow the whole body of water to flow over the lowlands to the northward and eastward, until it found a channel in the Tatsing river, which conducted it to the sea. Thus not until after the flood of 1853 can the new course be said to have wholly established itself, and the old one to have become entirely dry."

Four years later (1872) Ney Elias accomplished an important journey across Mongolia, "carrying a new line of observations along the vast diagonal of that country from the gate of Kalagan to the Russian frontier on the Altai, through Uliassutai and Kobdo, a distance of upwards of 2000 miles." In this journey he crossed an extension of the great Gobi or Shamo Desert, and made his way for four hundred miles without a guide or interpreter.

We may here mention the zoological explorations of Armand David, a Lazarist priest, in the Mongol-

ian plateau between the years 1865 and 1868. In the latter year he visited Szechwan, and entered the hitherto entirely unknown Tibetan highlands on its north-west frontier, proceeding thence into the Kokonor territory. He discovered 50 species of birds, and 40 mammals; among the latter two monkeys inhabiting the forests of a very cold mountain region, and one unknown species of white bear.

Section 9. Perhaps the explorer to most widely illumine the problems of Chinese geography during the period under consideration was the famous German geologist, Baron Ferdinand von Richthofen. In 1860 he accompanied a Prussian expedition to the far East under Count Eulenberg. His most important journeys in China were performed during 1870, 71–72, in which period he visited the provinces of Hunan, Hupeh, Honan, Shansi, Che-Kiang, Ganhwei, Pechili, Shansi, Shensi and Szechwan, and made a detailed geological exploration of the regions around Nanking and Chinkiang. His only European companion throughout many of these journeys was his interpreter.

CHAPTER XXV.

ASIATIC EXPLORATION—1875 to 1901.

Section 1. Looking at the map of Asia, it will be seen that from the Pamirs, west of Chinese Turkestan, two diverging lines drawn in directions approximately north-east and south-east would cut out a great wedge-shaped slice of the continent, and this blunt wedge of territory would consist almost entirely of the Chinese Empire and those states which have been called collectively Indo-China. Moreover, these imaginary lines would lie practically among mountains throughout their length, that to the north lying along the Tian Shan, Altai and Yablonoi ranges, that to the south keeping in touch with the great Himalayan system and the lesser ranges of Indo-China. Within this region, roughly marked off by natural barriers as well as by the imaginary lines we have drawn, lie the scenes of all the explorations with which this chapter is concerned.

Section 2. The Russians from the north and the British from the south had already done much towards unravelling the remarkable river system of Eastern Turkestan in its distant mountain sources;

yet at the beginning of the last quarter of the 19th century the great Yarkand or Tarim river, the culminating channel of the whole system, remained unexplored in all its lower course, and no map could tell us exactly where and how the journey of its waters ended. It is true the Chinese maps showed a great salt lake, Lob-nor, lying in the central desert, but all information regarding it had become obscured by myths and vague rumours, until its very existence had become an uncertainty. The first scientific traveller to throw light on the hydrography of the Lob-nor region was Colonel (afterwards General) N. Prejevalsky, whose earlier work has been described in the preceding chapter.

In 1876-77 this great explorer, starting from Kulja, in Russian territory, crossed the Tian Shan Mountains and the delectable uplands of Yulduz, traversed an inhospitable region to the Tarim river, and followed approximately the course of this stream to its goal in a great waterspread which he felt convinced could be none other than the ancient and mysterious Lob-nor. He also penetrated the desert south and east of the lake, where he obtained for Europe the first specimens of the wild camel, an animal only known by native rumour, and discovered the Altyntagh range, a wall-like rampart of giant mountains rising abruptly where Chinese maps had represented a level plain.

The Lob desert, where in the 13th century the great traveller Marco Polo heard at night "the voices of

ghosts and goblins" seeking to lure him to destruction, is described by Prejevalsky as the wildest and most barren he had ever seen. The lake itself he describes as little more than a great flooded morass, about 70 miles by 12, disappearing eastward in saline marshes. At its western end the water was fresh, contrary to all tradition, and the average depth was no more than three or four feet, deepening over small areas to a couple of fathoms. Two species of fish swarmed in the basin, which was nearly choked with gigantic reeds, more than twenty feet high.

During 1879-80 Prejevalsky made another scientific reconnaissance in Central Asia. From Fort Zaisan he reached and ascended the Urungu river, and its chief tributary the Bulugun, to their sources in the Altai Mountains. Thence he crossed to the foot of the Tian Shan over a waste which he called the desert of Dzungaria, a sort of bay or outlying arm of the great Gobi. Here he discovered a species of wild horse, now known as Prejevalsky's horse, and again met with the wild camel. The next point of interest reached was the Nan-shan range, the eastward continuation of the Altyn-tagh which he had discovered three years before.

Crossing this glittering barrier to the south he entered the Tsaidam depression, and turning eastward, struck the route he had already followed into Tibet in 1873. By this pilgrim's road he reached Napchi, within 170 miles of Lhasa, but here his progress was barred by the Lamas, and the expedition turned back.

Again in 1883, starting from Urga, Prejevalsky crossed the eastern Gobi in its wildest part to Alashan. Early in the following year, by a southward excursion from Tsaidam he reached the sources of the Hoang-ho in a region known to Chinese geographers by the romantic name of Sing-su-hai (sea of stars), but called by the Mongols Odontala (thousand springs). This region, lying among the tangled mountain systems in the north-east of the Tibetan plateau, and never before seen by a European, he describes as a "tussocky marsh land, dotted with lakelets, and bearing evidence of once having formed the bed of an inland sea." Its elevation is 14,000 feet above the sea.

Thence he traversed eastern Tibet to Di-chu (the upper Yang-tse-Kiang), but was unable to get his camels across. He therefore turned back and explored more fully the watershed between the sources of the Hoang-ho and the Di-chu, a humid and chilly region abounding in impassable swamps.

In 1885 he continued his journey westward from Tsaidam, between the southern border of its sterile salt-marshes and the foot of the northern buttress mountains of Tibet, discovered and explored the Valley of the Winds, between the Altyn-tagh and Kuen Luen Mountains, and farther explored the Lob-nor region. Thence he followed the desolate Kuen Luen range westward to Khotan, visiting the oases of Cherchen, Kiria, and Nia *en route*. Following the Khotan river northward through a wide waste of drift-sand

on his way towards Russian territory, he discovered a geographical novelty in the Mazar-tagh hills, which run in two parallel and contiguous chains, the northern range being formed of white alabaster, and the southern range of a deep-red clayey rock interstratified with gypsum. Beyond these hills the Khotan gradually diminished in volume, disappearing altogether about ninety miles short of the Tarim, to which its waters should be tributary. Moreover a large lake, known to have formerly existed to the west of the upper Khotan river, had entirely vanished.

General Prejevalsky died while preparing for another expedition into Central Asia, the geography of whose obscure regions he had already done so much to elucidate. He had traversed the great desert of Gobi in many portions of its sterile and storm-swept expanse, had traced an unexplored section of the wildly desolate Kuen Luen range, which has been called the "backbone of Asia," through twelve degrees of longitude, had added new mountain chains to the map, had prepared the way for more detailed investigations in the unstable Lob-nor district, and had thrown a flood of light upon the fauna of the various regions to which he penetrated.

Section 3. Between India and China there lies a difficult and barbarous region, ridged with mountains and gashed by deep gorges, a region which has always presented formidable obstacles to both exploration and commerce. Sir Henry Yule has described it as a land "where a number of great rivers rush southward

in parallel courses, within a very narrow span of longitude, their delineation on the map recalling the fasces of thunderbolts in the clutch of Jove." This was the field of Garnier and Sladen's expeditions, already described, and here, in 1874, Lieutenant Margary had been brutally murdered at the end of an adventurous journey.

In 1876 Mr. Edward Colborne Baber accompanied a mission across Yunnan to Bhamo to investigate this murder; and in the following year covered unexplored ground during a solitary journey in western Szechwan. Here he brought to light the Lolos, a tribe not previously described, from whom he procured books written in an alphabetic character quite unknown. In 1878 he visited the rugged country of the Sifan or "western barbarian" tribes between China and Tibet.

Captain W. G. Gill, in 1877, travelled from Hankow on the Yang-tse-Kiang to Batang on the eastern borders of Tibet, and thence south by Talifu to Bhamo, making a careful survey of his route.

The Hungarian expedition under Count Szechenyi (1878-80) visited Batang, Talifu and Bhamo, and although it followed unknown routes for short distances only, it threw new light on the geological problems of eastern Tibet and Indo-China.

Still more important was the journey of Mr. Archibald R. Colquhoun in 1881, which threw a shaft of light across Indo-China from east to west. Starting from Canton he ascended by junk the southern branch

of the Si-Kiang, a river of most unusual beauty, to the head of navigation at Pe-se, some 400 miles from its mouth, and continued the ascent for two days by canoe, through a constant succession of rapids. He then struck overland through unexplored southern Yunnan, a sunny and fertile region which afforded a marked contrast to the cloudy, sterile highlands of the same province farther north. At the town of Ssumao, on the Burmese frontier, he was forced to turn north. Following the unexplored valley of the Papien river for twenty-one days, through scenes of striking beauty, he reached Talifu, here linking his survey with Mr. Baber's. Thence his route lay through Bhamo to the Irawadi and down that river to Rangoon.

Mr. Colquhoun was the first to cross Indo-China from sea to sea in so southerly a latitude. His survey from one hundred and fifty miles west of Canton to Talifu covered entirely new ground, except where it crossed Garnier's route.

Prince Henri d'Orleans in 1895 was the first European to accomplish the most direct route from China to India. His expedition left Talifu in Yunnan, crossed the Mekong, and reached the valley of the Salwin, where the country became so difficult that the explorers had to send back the mules and proceed on foot. A month of most arduous marching brought them to the plain of Khamti, whence by a journey of three weeks over an unexplored route they arrived at

the first village of Assam. Finally they reached Sadiya in British India.

The geographical results of this adventurous expedition were the untangling of the upper courses of the Irawadi and Salwin, and the discovery of a new route between India and China. This route, however, is much too difficult for purposes of commerce, as may be gathered from the fact that Prince Henri had to cross thirteen chains of mountains in two months, and to penetrate the country of fierce and warlike tribes.

Section 4. Mr. A. H. Keane describes the Pamir as the nucleus of the whole Central Asian highland system. For long considered the most alluring problem of Asiatic geography, and at one time supposed to be associated with the beginnings of the Aryan race, it has been largely divested of its mystery, and traversed in all directions by the explorer, the scientist, and the sportsman. We now know it as a high region with an area of about 30,000 square miles, buttressed on three sides by snowy ranges, and intersected in various directions by mountain ridges rising to heights of from 14,000 to 17,000 feet above the sea. Between these ridges are broad and shallow valleys, which only towards the west deepen to the typical mountain gorges. Westward through these valleys wind the ramifying head-waters of the Oxus. The author above quoted says:—"The whole region is destitute of trees or shrubs, and even the grass grows only in isolated patches along the banks of the

streams; here, however, it affords some of the very finest pasture in the world to the flocks of the Kirghiz nomads who visit the Pamir during the summer season." The rise and fall of the thermometer between day and night is sudden and excessive, and even in winter extreme cold is non-persistent, the temperature often ranging from the freezing point of mercury at night to more than 32° Fahr. by noon. Although frosts occur throughout the year, except during two, or at most three, weeks in July, there is, on the whole, less snow-fall than one would imagine. Even in winter many parts are bare and afford scanty pasturage. Here is found that giant among mountain sheep, the *Ovis Poli.*

Several expeditions to this region from the south have already been mentioned. The first explorer to enter it from the north was Kostenko in 1876; while in 1883 another Russian expedition, under Captain Putiata, explored its eastern half, connecting the Russian and English surveys.

In 1886 Mr. Ney Elias made a journey across the Pamir and explored the large mountain-set lake Rang-Kul, which Sir Henry Rawlinson identifies with the famous semi-mythical Dragon Lake, "the holiest spot in the whole Buddhist cosmogony." The banks were covered with efflorescent and incrusted salts, while its deep clear blue water was said to be sweet. Mr. Elias writes:—"In following the track down the south shore of the Rang-Kul a rock or cliff is passed, standing about one hundred yards from the water's

edge, and presenting a sheer front of about a hundred feet in height towards the lake. This is called the Cheragh-Tash, or 'lamp-rock,' famous over these regions for a light which always burns in a cave near the top of the cliff, and is the object of a good deal of superstitious awe on the part of all Kirghiz, Shignis, and others who know the locality. To all appearance a steady white flame burns within the cave, but even with a powerful field-glass I could make out nothing more. My impression was that there must be some phosphorescent substance far back in the cave, but this, I was assured, was quite an erroneous view, the real fact being that vast treasures are stored in it, which are guarded by a dragon with a large diamond set in his forehead, and it is this diamond that shines by day and night."

Dr. G. Capus, in 1887, studied the Pamir climate, and two years later M. Henri Dauvergne ascended the plateau from the north-east. About the same time Captain Younghusband explored the central and eastern parts, entering first from the glacial heights of the Mustagh and Aghil ranges, and later from the lower levels of Kashgaria. He accounted for the shallow inter-lying Pamir valleys, their bottoms on a level with the higher summits of the Alps, by the theory that they were once profound mountain gorges "which have been gradually filled up by the detritus from the enclosing ridges accumulating too rapidly to be carried away by the running waters."

In 1890 the Pamirs were crossed from north to

south by Mr. and Mrs. Littledale, and two years later the work of several Russian surveyors was brought to completion, and practically the whole region mapped with some thoroughness and detail.

Section 5. To Tibet, even more appropriately than to the Pamirs, might have been applied the term "roof of the world." With an expanse of surface far exceeding the combined areas of Germany, France and Austria, its wide bleak plains lifted as it were on the shoulders of giant mountains to a height in places of as much as eighteen thousand feet above the sea, it represents in all probability the most enormous intumescence to be found anywhere on the earth's crust. It extends east and west some two thousand miles with a breadth in its central part of more than six hundred miles, and an average altitude of over 14,000 feet. Immediately north of the soaring Himalayan range, which forms its southern rampart, lies a comparatively settled district, made inaccessible by the policy of the Lhasa Government rather than by the nature of the country. Beyond this the land rises steadily higher, through a middle zone, whose pastures are visited by a migratory nomad population, to the great uninhabitable northern zone, whose lofty deserts are buttressed by the desolate Kuen Luen system.

Here we meet with the puzzling phenomenon of a region supporting the most meagre flora, yet overrun by countless numbers of wild animals. Of trees there are none, but several species of grasses flourish where

they can find shelter and moisture. Prejevalsky found only three kinds of shrubs, one of which, the willow, grows to half a foot in height, while the others only venture to trail along the ground. Of animals, however, the same explorer records, among others, five kinds of carnivora, and eleven species of large herbivora, and states that in the course of one day he sometimes saw hundreds of herds of wild yaks, wild asses, and antelopes, none of which showed alarm at the approach of man. Mr. E. Delmar Morgan has pointed out that it is owing to the presence of these vast numbers of wild animals that travellers have succeeded in crossing the high plateau of northern Tibet, their dry dung being the only fuel to be found there.

During 1885-87 Mr. A. D. Carey and Mr. Dalgleish accomplished a remarkable journey of nearly five thousand miles in Central Asia, by which they practically made the circuit of Eastern Turkestan, and traversed in places the heights of Northern Tibet. From Leh the expedition struck north over mountains and uplifted plains to the Kuen Luen by a route more easterly than that of any previous explorer, descended to the Khotan oasis, and, after travelling around the north of the Tarim basin and south again to Lob-nor, prepared for a second entrance into Tibet. Between the Altyn-tagh and Kuen Luen ranges they wandered without guides for eighty days under conditions of great privations before they found a pass across the latter mountains, and reached traces of other human

beings. When at last, in the chill loneliness of the North Tibetan desert, they discovered the track of a recently passed caravan, the Turki servants "threw themselves on the ground, kissed the foot-prints, and sobbed with delight." Continuing southward, the explorers reached the Ma Chu river, four hundred miles from Lhasa. Here the failure of supplies compelled them to turn back, but they succeeded in following an entirely new route westward to Hajjar and northward to Saitu.

In 1888-9 Mr. William Woodville Rockhill, an American traveller who had acquired a mastery of the Tibetan spoken language, made an important journey through eastern Tibet from Tsaidam southwards to Jyekundo on the Dré-chu, and thence south-east to Ta-chien-lu in Szechuen, across the difficult districts of Derge and Nya-rong, which for twenty years the Roman Catholic missionaries had fruitlessly endeavoured to penetrate. Mr. Rockhill travelled in the disguise of a lesser Chinese official. Such were the amenities of travel in eastern Tsaidam that it was accepted almost as a matter of course that when two parties met in the wilderness the stronger should rob the weaker. Everywhere the country was alive with game, so much so that in a journey of three days between the Tosun-nor and the Alang-nor he saw at least a thousand wild asses alone. He heard also, from many sources, rumours of the existence of wild hairy men in the obscure mountain-fastnesses of Eastern Tibet. In 1891-92 Mr. Rockhill made another jour-

ney, by different routes, in the same region, again failing to reach Lhasa, although he penetrated as far south as the Namon pasture lands.

During 1889-90 a Russian expedition under M. V. Pevtsoff, who had accompanied Prejevalsky on some of his journeys, made extensive researches in Central Asia, in the course of which it further explored the northern slope of the great Tibetan plateau, and made excursions southward into the high desert. Pevtsoff tells us that the few mountain people who dwell in caves in some of the northern valleys of the Kuen Luen regard with a superstitious dread this vast desert on their south, which they call "the land beyond the clouds." A part of it which he visited south of the Akka-tagh ridge presented a great flat solitude covered with sharp quartzite *débris,* at an altitude of 17,000 feet. On this barren floor snow falls all the year round, but does not lie, and neither mosses nor lichens are to be found. In contrast may be mentioned another discovery made by the same expedition, but far beyond the borders of Tibet—the remarkable Luk-chun depression, in the north-east of the Tarim basin. The bottom of this depression, which has a length of 95 miles and a width of 27, is more than 150 feet below the level of the sea.

Next in order of time came the crossing of Tibet from west to east by Captain A. Bower, of the Bengal Cavalry. Starting from Leh in 1891, he followed at first Carey's route northward, then turned almost due east through Tibet, passing nearly three degrees

to the north of Lhasa. He explored a long chain of lakes never before seen by a European, and reached the settled districts of China after a journey of some three thousand miles, in the course of which he traversed at least 800 miles of new country. Supplies for almost the entire distance had to be carried from the start.

The vast uninhabited region of northern and central Tibet is known as the Chang. Captain Bower describes it as a huge table-land ridged with hills and mountains, and having no defined water-shed, the rivers when met with flowing in almost any direction, but all terminating in large salt lakes. He says:— "An idea of the physical configuration of the country may be gathered from the fact that for five months we never once camped at a lower altitude than the summit of Mont Blanc; and all the enormous stretch of country we covered in that time contained not a single tree." At an elevation of 17,930 feet he discovered a large lake dotted with islands, probably the highest in the world.

Four years later (1895) Mr. and Mrs. St. George A. Littledale, who had previously carried out daring journeys in the Pamirs and in the Desert of Gobi, crossed Tibet from north to south to a point within fifty miles of Lhasa, whence they turned westward, bringing their hardships to a close at Leh. Their route was a new one, and they were the first Europeans to reach the Nyenchen-tang-la Mountains, a snow-capped range of inexpressible grandeur, con-

sidered by geographers the northern chain of the Himalayan system. At Tengri-nor they connected their survey from the north with that of one of Montgomerie's pundits from the south. The starting point of this journey was Cherchen, in Chinese Turkestan. While in the depths of the northern solitudes all their sheep were killed by wolves, and the travellers had to depend largely upon their rifles for food. It was only by great firmness and courage that they pushed as near as they did to Lhasa, in spite of peremptory orders to turn back, and a show of armed opposition at almost every pass. Besides a careful route-survey which supplied important additions to geographical knowledge, they brought back ten plants new to science.

During the following year Captain M. S. Welby crossed from Leh to Peking by a more northerly route than Captain Bower's, his course through Tibet lying chiefly along the 35th degree of latitude. For four months this route had an average elevation of 16,000 feet, and for fourteen weeks he saw no sign of mankind. The nights were intensely cold, the days often uncomfortably hot, and for more than a month fresh water was only obtained by digging. The thirty-nine baggage animals with which he began his journey all perished before its end, and his party only staved off starvation by eating the wild onions which grew in enormous beds in some of the valleys.

In the same year Captain H. H. P. Deasy made a journey of exploration and survey in Western Tibet,

and succeeded in carrying on triangulation throughout, closing his work on two points already fixed by the Indian Survey. In the beginning of his journey, at the edge of a most inhospitable region, he saw the unforgettable spectacle of great herds of antelopes in such numbers that "there could not have been less than fifteen thousand in view at one time." Of his sixty-six mules and ponies, only six survived the hardships of the journey. In 1897 Captain Deasy carried his survey into the Pamirs and the upper valley of the Yarkand, the result of these two years' work being the mapping of 40,000 square miles of country not before surveyed.

Section 6. The great Swedish explorer and geographer Sven Hedin, began his researches in Asia when only in his twenty-second year. After various journeys in Persia and Bokhara, which may be regarded as a preparation for his more important work, he entered the Pamirs in 1894 and began the series of explorations and discoveries by which he rose speedily to eminence in the scientific world. In that year he ascended the famous Mustaghata, "Father of the Ice Mountains," for some twenty thousand feet, but failed in four attempts to reach its triple summit, whose huge inaccessible and glittering peaks have accumulated myth and legend from time immemorial. The imaginative Kirghiz say that even the wings of the eagle are powerless to reach the summit, where lies a celestial city, Janaidar, in whose gardens death, cold, darkness and misfortune are unknown—the old,

sensuous, alluring dream of eternal beauty and the unfading joys of youth, that has through all time haunted the heart of man. Dr. Sven Hedin writes:—"In respect to its geographical position, this mountain plays the double *rôle* of being the strongest eastern outpost of the Pamir Plateau, and the last northwestern outpost of the earth's highest culminating points, which all belong to the Himalaya, Karakoram and Tibet mountains." He mapped carefully its vast glaciers, and carried his survey of the surrounding region far into the central Pamir.

In the following year he accomplished a terrible journey across the Takla-makan desert, between the rivers Yarkand and Khotan. Starting from Merket with four men, eight camels, and a number of sheep and fowls destined for the pot, he reached after nine days of eastward journeying, a small group of mountains with sweet-water lakes and green-clad marshes at their feet. Up to this point the monotony of the desert had been broken by occasional changes of aspect, level floors of hard sand or clay sometimes taking the place of rolling sand dunes; brackish water for the animals was often to be found by digging, while spiders, lizards and moths lent a touch of life.

After resting a day or two at the mountain oasis, he plunged again into the desert, continuing his march still eastward. At first the ground was hard, covered with a soft impalpable dust, but soon the sand-mounds reappeared, and all traces of life were speedily left behind. Each day only took him deeper

into the deathly solitude, where the sand-combs, becoming steadily higher, resembled great petrified waves, their crests towering to a height of one hundred and even two hundred feet. The air was dim with flying particles, which served to temper the heat of the sun, while they gave a still more spectral appearance to the weird scene. At the third camp after leaving the oasis, he records the fact that "a wasp, two mosquitoes and a raven enlivened us a little; they had probably been carried along by the wind, or had perhaps been following us." Here two of the camels died. During the sixth day from the oasis, a terrific storm of wind raged, and "a dark fire-yellow light filled the air, which was full of a loud whistling and hissing sound as billions of grains of sand shot past." Another camel died, and during the night the last pint of water was stolen. The next two days brought little change, except that both men and animals grew constantly weaker. Once they were cheered by discovering a single dead leaf, which spoke to their fevered imaginations of forests and green cool places. On the ninth day the last sheep was killed, but its blood was too thick and ill-smelling to quench thirst. Here two of the men gave up, but the others staggered on. By midnight another fell, seized with convulsions. He was left with a lantern burning beside him. Sven Hedin and his one remaining servant crawled forward for two more days through the seemingly endless ocean of fine yellow sand, reaching at last a few tamarisks, but still no water. Here they

built a large fire as a signal to those left behind. Another day dragged by like a nightmare, and they found themselves among green and living trees, and saw footprints of horses in the sand. Here Hassim, the last servant, became unconscious, but Sven Hedin staggered on. At night he reached the bed of the Khotan river, only to find it dry. Staggering across this in the moonlight, suddenly, with a splash, a duck rose at his feet, and he was at the edge of a clear sweet pool of water. With returning strength he filled his boots with the precious liquid, and went back to Hassim. After struggling southward along the river-bed, which contained frequent pools, for three days on a diet of tadpoles and leaves, he fell in with a party of friendly nomads.

In 1896 this dauntless explorer again crossed the Takla-makan by another route from Khotan to Shahyar. In the course of his journey he discovered two ancient cities, which had been buried for centuries beneath the moving sea of sand, to be laid bare again as these strange inexorable waves crept westward. He writes:—"In the valley between the dunes, we could see, as far as the eye could reach, ruins of houses built of poplar. The timbers were very much worn by drift-sand, chalk-white, hard, and so brittle that they broke like glass when struck. The walls consisted of interwoven reeds covered with plaster, on which we found some artistic mural paintings—praying women of the Aryan type, Buddha sitting on the cup of the lotus, tasteful ornaments etc. An exca-

vation led to the discovery of a manuscript and some plaster casts."

In the same year he threw fresh light on the Lob-nor district, the curious lake-system in which the waters of the Tarim find their goal. Here he discovered the dry bed of what was once a great lake with forest-clad banks, which he believes to be the true site of the historic Lob-nor. Prejevalsky's Lob-nor, which lies farther south, has no forests, and Dr. Sven Hedin estimates its age to be only about two hundred years. According to him, the whole of this low sandy area is a region of travelling waterspreads, where both lakes and rivers constantly shift their beds.

From Lob-nor he carried his explorations into northern Tibet, and in an unknown part of that desolate storm-swept plateau discovered a great chain of bitter lakes, whose "high white-crested waves, green as emerald, beat with a metallic ring against the shore," in a region of unbroken solitude.

During 1899-1900 Dr. Sven Hedin surveyed with great minuteness the Tarim river and its upper course, the Yarkand, descending by boat from Lailik to Prejevalsky's Lob-nor. In 1901 he made a more exhaustive exploration of this terminal system of shifting lakes. Near what he considers the true Lob-nor he discovered an ancient Buddhist temple, with Chinese manuscripts nearly a thousand years old.

PART EIGHT.

EXPLORATION IN AUSTRALIA AND NEW ZEALAND.

CHAPTER XXVI.

EARLY EXPLORATIONS IN AUSTRALIA.

Introductory. No army ever had a more grim, determined foe to face than the early explorer found in the continent of Australia, which, from the mere topographical features of the country, offered greater resistance than any save Darkest Africa. What has been done during the last century to open to the world the Australian interior is a vivid illustration of the power and persistence of the spirit of investigation.

Section 1. Though the Continent of Australia with its adjacent islands of Tasmania and New Zealand lay a dark, unknown land until the beginning of the nineteenth century, yet as early as 1606 its beaches knew the keel of the stranger's ship. At that early day, when the romantic adventurer trimmed his sails to the winds of the four quarters of the globe, Torres, the Spaniard, gave his name to the

straits that lie between the north-east coast of the continent and the Island of New Guinea, and forty years later Tasman, a Dutch captain, landed at the great island now known by his name, and called it Van Diemen's Land, in honour of his Governor.

Neither Torres nor Tasman made an attempt to land; but with the advent of that graceless rover Dampier, in 1684, England was first, not only to set foot on shore, but to attempt a way into the jungle. Finding this task a difficult one, and the sands far from golden, the buccaneer relinquished his hopes of Golconda here and turned his prow towards more profitable shores.

It was left to Captain Cook, in his scientific voyage to the southern ocean for the purpose of observing the transit of Venus, to begin the navigation and survey of the coast; and it is matter of remark to-day, considering the rudeness of his implements, with what accuracy his measurements were taken. His maps, amended in part by Lieutenant Flinders, were in use among the seamen of these coasts for the first half of the nineteenth century.

But the first voyage for the purpose of discovery was made in 1797, when Captain Hunter, with the ship *Reliance* and a squadron of transports, crossed the ocean to Port Jackson, there to establish the English penal colony at Botany Bay. In the *Reliance* with Capt. Hunter there sailed a midshipman, Flinders by name, and it was this boy who was so fired by the spirit of discovery at sight of the strange

shores, that he, together with a young surgeon of the ship, one Dr. Bass, begged leave of the Captain to take a boat and voyage along the coast while the *Reliance* lay in harbour. Obtaining, by dint of much persuasion, a small craft called the *Tom Thumb,* they left Botany Bay, and sailing south, circumnavigated Tasmania, proving it to be an island instead of a part of the continent, as had been supposed.

The memory of this first voyage remained constant in the boy's mind, and three years later he sailed from England in his own ship, the *Investigator,* landing at Cape Leeuwin, at the south-western extremity of the Australian coast. Directing his course eastward he sailed through the Recherche Archipelago, naming such bays and islands as he entered or sighted, and hugging the coast, as closely as he dared.

Passing Nuyts Reefs he found himself on an unknown, unnamed coast. A little further on in one of the numerous inlets that indent the southern coast he came upon a French ship, *Le Geographe,* under Capt. Bauden; and because of this unexpected meeting in such a lonely place, he named the inlet Encounter Bay. Proceeding from here to Bass Strait, and crossing the channel to Cape Otway, he entered the harbour of Port Phillip.

After three months spent in making repairs, the tireless traveller set sail again, this time towards the north. At the Murray Isles in Torres Straits he saw for the first time the Australian aborigines, who showed a tentative hostility, mingled with great fear

of the white men. Turning west he entered the Gulf of Carpentaria and spent over three months exploring its shores, touched at Melville Island, which he named as his furthest western point, returning thence to Sydney, having navigated and surveyed more than one-half of the coast of the continent, discovered the Gulf of Carpentaria, and circumnavigated Tasmania. His observations of winds, currents, soundings, and harbours, and his accurate charts of the coast were of great value to his government, but England was tardy in gratitude, for when during the French and English war he was seized and held a prisoner by Governor De Caen of Mauritius, he was seven years in prison before his release was obtained.

The work that Flinders had so ably begun was completed by Capt. Philip King, who, accompanied by the famous botanist, Allen Cunningham, traversed the northern coast, passing Melville Island, Lieut. Flinders' extreme western point, and reached Van Diemen's Bay.

On the return voyage they discovered on an island in Princess Charlotte's Bay some very curious picture writing in the caves of the sea cliffs. Rude shapes of birds, fishes, kangaroos and curious conventionalized trees and plant forms appeared, executed on the rock walls in red and white chalk. Cunningham supposed it to be the work of the natives, but a closer acquaintance with the Australian aborigine showed them not sufficiently intelligent for even this primi-

tive form of art. In the four years that were spent in voyaging about with little adventure they acquired a sound knowledge of the eastern and northern coasts, and excellent sailing directions, all of which were invaluable to their followers, Captains Wickham and Stokes in the good ship *Beagle*.

Section 2. From the day she sailed out of the Thames on her maiden cruise, the *Beagle* was a craft of discovery. Captain Stokes called her a "coffin-brig." She was short and stubby, and unbeautiful, but she rode the stormy south seas like a duck, and adventured farther up the Australian rivers than any other ship of her day. In 1826 she made her first voyage to South America, returning to England after an absence of four years. But the tramp habit was strong in her, and the following year found her on the high seas again, headed for the southern ocean. On the way thither she touched at King George's Sound, and anchored a day and a night in the Bay of Islands off the New Zealand coast. On this voyage Charles Darwin was on board as an independent enquirer into the natural science of the islands of the south seas. This short glimpse of the fifth great continent of the world sufficed to arouse the curiosity of the *Beagle's* captain.

Two years later, in 1837, the little ship, under the command of Capt. Wickham, later under Capt. Lort Stokes, who had begun his career as midshipman on this same vessel, set sail for the Australian coast. With Capt. Wickham also sailed two explorers,

Lieuts. Grey and Lushington. It had been their intention to land at the Swan River, but Lieut. Grey, fearing he could not obtain the right sort of boat here, had his party landed at the Cape of Good Hope. From here the *Beagle* proceeded to Perth, the settlement of West Australia. It was Wickham's intention to secure a fuller, more exact knowledge of the entire coast, and for this purpose to traverse and survey Flinders' northern route, and explore the western coast for certain rivers believed to exist there.

Taking supplies of water and food at the settlement, he directed his course northward to King's Sound, where he discovered the Fitzroy River. Low tide showed its mouth a mere mud sink, but waiting for the flood to float them over it, they were able to navigate the river for a number of miles. On either hand they saw dreary flats covered with coarse grass, dotted at intervals with lone trees. A few emus, and an occasional flock of bronze-winged pigeons, were the only signs of animal life. As they advanced the trees increased. They passed groves of eucalyptus and acacia, and two species of palms. From Port George the Fourth the *Beagle* returned to Sydney by way of Tasmania, thus closing the expedition for that year.

In the spring of 1839 the *Beagle* again took the northern track, and touched at Port Essington on the extreme north coast. They found the harbour here a fine one, and the country on its shores covered with magnificent forest of oak and teak. From Essington

they explored the great Barrier Reef and Clarence Straits, and here they came upon the mouth of another great river, which Capt. Stokes called the Adelaide. In attempting to navigate it through thick bamboo and mangrove jungle they were attacked by natives, who hurled their spears down on them from the cliffs above, and forced them to turn back.

Again, at Cambridge Gulf they discovered yet another river, the Victoria, flowing to the sea between high rocky walls and sandy hills; but farther inland the country improved, and they saw numbers of kangaroos on the high plains. All this region of the north Stokes pronounced well adapted for settlement, and Essington a good point for expeditions of exploration to start from. For six years this valiant captain cruised about the Australian coast, circumnavigating it, learning it thoroughly, and making it familiar to the men who followed him.

Section 3. But neither Stokes nor any of his expedition had cared to venture far into the interior, away from the navigable rivers. Two other men, however, had come over in the *Beagle* with exactly this intention, and were prepared with provisions and camp equipage for a long journey. Neither Lieut. Grey nor his friend Lushington had ever been in Australia before, nor ever explored in any portion of the globe. A handful of corn and a good knowledge of the country they were about to enter would have stood them in far better stead than all

their camp paraphernalia. But they were young, sanguine, and enthusiastic, and the idea of failure did not occur to them.

The ship *Beagle* put them off at the Cape of Good Hope, and from here in their own ship they sailed for Hanover Bay where they anchored, and from this point entered the forest. They found it more difficult to cut a path through the jungle than they had anticipated, for the trees and bushes were matted together with long thorny creepers, and under foot the quaking black quagmire was hidden beneath deep fern. But they struggled bravely forward, expecting every moment to come out of the forest upon a grassy highland, or into a fertile valley. When they finally emerged from the blind jungle they found that the dangers of their journey had just begun. Instead of the grassy highlands they saw wild rocky plateaus cleft by ravines of such depth and steepness as to be impassable for horses and precarious in descent for men. The valleys were mere mud sinks, or at best impassable marshes. Thus, making long detours around these obstacles, though they only penetrated sixty miles inland as the crow flies, they marched one hundred and fifty, more than double the distance. They were drenched with rain, as thunder-storms were of almost daily occurrence, exhausted with hard climbing and insufficient sleep; but in spite of the difficulties that Nature thrust in their way, and the stern character of the strange, rocky shapes, pillars and shafts and pinnacles of basalt rock, they found

much beauty of a wild sort, as the vegetation was luxuriant, and animal life abundant.

The natives of this section were more warlike than the black men of the east. They attacked the travellers, and a spear hurled by one of them wounded Lieut. Grey in the leg. He insisted on pressing forward in spite of the wound, and going farther south came upon the Glenelg River, where among the basalt rocks of its mouth they found some rude hieroglyphics, similar to those seen by Cunningham in Princess Charlotte's Bay. The natives could tell nothing about them, from which Grey gathered that the mural decorations must be the work of strangers, ascribing them to the Malays, who from time to time visited these shores.

By this time several of Grey's party were ill, and he himself was suffering severely from his wound. His intention had been to explore the river district northward from the Swan River. Mounting one of the sandstone hills for a better view of the country, he saw that northward the difficulties of the road increased; and exhausted as he and his men were they dared not try to go forward. The return march was of necessity very slow, and their water supply giving out they suffered from thirst. When at last they sighted the sea, the whole party, forgetting weariness and sickness, ran with a shout and plunged into the breakers, relieving their drouth with the sea bath until water could be brought from the ship.

From Hanover Bay Grey went to Mauritius. He

had by no means given up his plans; indeed he was even more eager than before to demonstrate that he could explore the western coast successfully. After three months spent in recruiting the strength of his party and getting supplies, he again set sail for Australia, this time entering Shark's Bay.

Here began the long series of disasters of this ill-starred expedition. The first was the loss of a boat laden with provisions, while they were making a landing through the heavy surf on an island in the bay. Upon beaching all the boats they found there was no water. This necessitated returning to the mainland, where they were delayed by a wind storm.

When at last they reached the island again they found that their provisions, which for safe-keeping they had buried in the sand, had been uncovered by the whirlwind and, with the exception of one cask of salt pork and half a barrel of flour, swept away by the sea. The men gave themselves up for lost, but Grey laughed at their fears, and immediately prepared to return to Perth by sea, there to lay in a fresh stock of provisions.

In attempting the ocean passage they encountered high winds and heavy seas, that delayed them for days, and finally forced them to put in to the mouth of the Murchison River. In trying to beach the boats in the storm one was lost and another so badly crushed as to be useless. Upon landing they found themselves much depleted in strength by hardship, three hundred miles from Perth, in a wild, unknown coun-

try, with but twenty pounds of damaged flour, and one pound of salt pork to each man.

It was now that the genius of Lieut. Grey manifested itself. He marshalled his little party with the idea of making a forced march, as many miles a day as possible, in the hope of reaching the settlement before the food should be exhausted. In the face of all the discouragements of this dreary march, he kept unwavering courage where others despaired, unflagging energy where others failed; he divided his own provisions with his men, cheering them, trying to keep the stragglers up with the main column. But at last it was plain that he could never bring any of his party alive into Perth if he waited for the weaklings. So, making a camp on the bank of a river, and leaving the greater part of his following there, he, with a few of the stronger men, pushed on to Perth; and so great were their sufferings by the way, so emaciated, so parched, haggard, and wild-eyed did they appear that their friends failed to recognize them. A rescue party was immediately dispatched to the relief of the stragglers, whom they brought back with the loss of only one man.

CHAPTER XXVII.

AUSTRALIA AND NEW ZEALAND.

Section 1. While a few gallant and adventurous seamen were voyaging along the stormy Australian coasts, surveying, naming and charting the islands, bays and promontories, and navigating a few of the coast rivers, various expeditions were making known the eastern and southern interior, now comprised in the provinces of Queensland, Victoria and New South Wales.

The first men who crossed the Blue Mountains and looked into the strange valleys on the other side were prompted neither by a spirit of adventure nor the urge of scientific investigation, but by the necessity of finding new pasture lands for their flocks. The valley behind Sydney between the mountains and the sea is very narrow, and was insufficient to pasture the flocks of the colonists. A season of drouth threatened the sheep and cattle with starvation, so Wentworth and Lawson, two ranchmen of that region, climbed the Blue Mountains, and from the top of the watershed saw a fertile valley and a strange river. Evans, the surveyor, at a later day, named it the "Macquarie," after the Governor.

The following year a number of settlers were sent by the government across the mountains to settle that region which the Governor had called Bathurst Plains. The Macquarie, explored by Lieut. John Oxley in 1817, was found to end, as did so many of the lesser rivers of Australia, in a swamp. These rivers of the east and south proved very baffling on account of their devious courses, their sudden expansion into lakes, their unexpected way of disappearing into mud sinks or marshes. In 1819 Hamilton Hume discovered and traced part of the Brisbane River, and at the same time Oxley explored the Murrumbidgee, but could not find their outlets.

In the hope of discovering what became of these great waterways flowing north-west and south-west into the interior, Governor Darling dispatched a party under Capt. Sturt to solve the problem. Coming to the Macquarie marsh and finding it impassable, Sturt turned westward, and reached the banks of a large river, which he called the Darling. Following its course he found that it flowed, together with the Lachlan and the Murrumbidgee, into a yet larger river, which he called the Murray; and which he succeeded in tracing through Lake Alexandrina into Encounter Bay. They found the Murray a broad and placid river, in contrast to the rapid Murrumbidgee, and as they drew south the country lost much of its wild rocky aspect, and became flat and meadow-like, a fine pasture land.

With the discovery of this fertile valley there was a

general move west and south from the coast settlements. But the pioneers entertained a pet idea that the interior was a vast grassy pasture land, and with the purpose of proving the verity of this in 1841 Edward John Eyre attempted to pass the salt marshes of the Lake Torrens District, and enter the great interior. As he approached the lake he found the earth crusted with salt. The year had been one of great drouth, and the prospect was unutterably dreary. High rugged hills rose to the east of Torrens; before him lay the impassable mud lakes, and a few forlorn gum trees were dying for lack of water.

Finding the entrance to the interior barred to him he turned south once more, and, journeying along the coast, reached King George's Sound in West Australia, having travelled a distance of over one thousand miles, with one native boy for companion. His health was so broken from the hardships and exposure of this journey that he relinquished his hopes of piercing the continent. He left that to the sturdy adventurer, Sturt.

In 1844, Sturt set out from Adelaide with the intention of crossing the continent from Adelaide on the south to the Gulf of Carpentaria on the north. He made his way successfully through the sand hills and spinifex of the desert. He found wonderful oases in the heart of the sand hills, both at the Barrier Ranges and Flood's Creek. Leaving these pleasant camps behind, the party presently re-entered the sterile desert, and pushed on, making short excur-

sions out of their course in search of water, until they reached a point 150 miles from the centre of the continent. Here he was forced to turn back on account of the sickness of a number of his party, and it was left for one of his followers, some fifteen years later, to make this journey as he had planned it.

While Sturt was making his difficult march into the Australian desert, a German scientist, Dr. Ludwig Leichhardt, was exploring eastern Queensland from the southern border to the Carpentaria Gulf. In 1844 he travelled from the head of the Condamine River to the shore of the Gulf, and thence west to Port Essington, a distance of 3000 miles, in less than fourteen months. During this journey he discovered the Mackenzie and Burdekin rivers, and crossed a great tract of arable country.

In 1865 Augustus Gregory continued the exploration of this region, at the order of the Royal Geographical Society. He landed at the mouth of the Victoria River, and ascending to its source, crossed the stream at a point 1600 feet above the sea level. Again, from the mouth of the Victoria he pushed eastward, exploring along the shores of the great gulf as far as Brisbane, thus opening for settlement the valley of the Victoria and the fertile land adjacent.

Meanwhile Dr. Leichhardt, who was greatly interested in the geology and the flora of the new colonies, conceived a gigantic scheme for traversing the continent from east to west, and, through the assistance

of certain merchants, he equipped an elaborate outfit. This first expedition was obliged to turn back because of the severe illness of several of their number; and losing the home trail, they exhausted their supplies while wandering in the jungle. Leichhardt's patrons were not enthusiastic over a second attempt, but the scientist was determined to carry out his enterprise, and set out a second time, rather meagrely equipped for such a long and arduous journey. A letter sent back from McPherson's Station, 300 miles from Brisbane, was the last ever heard of him. The entire party disappeared as completely as if the earth had opened and swallowed them; and their fate is only surmised, as no trace of them has ever been discovered.

Section 2. Undismayed by the fate of Leichhardt's party, Capt. McDouall Stuart, who had been draughtsman to Sturt in his venture of 1844, determined to attempt the crossing of the desert which had heretofore so stubbornly defeated all adventurers. Taking only three men with him, he left Adelaide on March 2nd, directing his course to the west of Lake Eyre, which he had previously (1857) explored. He travelled over flat, grassy plains, with an occasional gum creek where were good water holes, until he reached the McDonald Range. Here he entered the desert proper, and journeyed over a waste of sand ridges, stretching away as far as eye could reach.

On the 22nd of April he made camp in the

centre of Australia,—the nominal centre, for it was a little too far to the north-west to be exact,—and here he found a fertile oasis, with plenty of water, and good pasture for the horses. Besides the lush grass and tall oats he found there a native orange tree, and a new variety of rose of a sweet heavy perfume. On the top of a high mound near the camp Stuart built a pile of stones, planted the British flag and named the hill Central Mount Stuart.

Leaving this central camp they entered the region of the "bush," and here their difficulties began. Various excursions were made to the west and east in search of water, which was very scarce now, and their course through the thorny scrub was of necessity slow. When within a few hundred miles of the Gulf of Carpentaria they encountered a tribe of natives whose hostility was such a menace in the face of their small number that they were obliged to retrace their steps to Adelaide.

The following year Stuart made a second expedition, and this time was able to reach a point only one hundred miles from his goal. But here he again met the Australian bush in an impenetrable and apparently endless belt stretching across his path. Scarcity of provisions made him fearful of long delay, and compelled him to turn back a second time.

Far from being discouraged by these failures, Stuart made a fresh start with a larger party in the year 1862. This third effort was successful. On the 10th of July they reached the source of the Adelaide,

which flowed through a winding gorge among flat-topped, thick-wooded hills. Ten days' march brought them to the Indian ocean itself, and here to the top of the tallest palm they could find they affixed the Union Jack. The party returned to Adelaide the following winter; and worn and exhausted though they were with illness, Stuart had not lost a man.

McDouall Stuart is accounted one of Australia's greatest explorers, not alone because he was first to cross the continent successfully from ocean to ocean, but also because he journeyed so rapidly, chose his route with such foresight, and took as little camp equipage and as few men as possible, like a good general taking the road in light marching order. Many there were no less courageous and indefatigable, but Stuart was resourceful as well as courageous, and a certain intuition of direction, given to few, made him great in his work. His march was of the highest importance, since it marked the way for the telegraph line, with stations used for bases of supply by later desert expeditions, and opened up the Adelaide River district, probably the most fertile in Australia.

Simultaneously with Stuart's first attempt to cross the great desert the Victorian Government sent out from Melbourne a party of eighteen men with wagons, pack-horses, and camels sent over from India for the purpose. Mr. O'Hara Burke was appointed leader, with Mr. W. J. Wills, a young astronomer, second in command. The party proved too large to be

manageable, and was disturbed by discord and insubordination. Hoping to rectify this mistake Burke made a camp at Menindie on the Darling River, where he left half of the expedition in the charge of a man named Wright, with orders to follow the advance column after two or three weeks' rest.

Pressing farther into the interior Burke found that his march was not sufficiently rapid; so making a depot of supply on Cooper's Creek, where water and pasturage were abundant, he left his party in bivouac, with instructions to wait for him for three months, and if at the end of that time he had not returned, to go back to the colonies. Then, taking Wills, his second in command, and two other men, Grey and King, he entered the wilderness. The country they crossed was well timbered with great forests of box-wood, with flat, alluvial meadows stretched between, watered by winding streams and creeks, from whose shores rose flocks of wild pigeons and duck. Six weeks out from Cooper's Creek they sighted the Gulf.

So rapid had been their northward march that they were quite unprepared for the misfortunes that beset them on their return trip. One of the men, Grey, succumbed to the heat and exposure. The three were obliged to kill their horses for food. Finally they lost their way, and wandered in a pathless jungle for days. When they reached the station at Cooper's Creek, they were so weak they could hardly walk. To their despair they found that the party

had started for the colonies that very morning. They were only a day's march distant, but the unfortunate men were too exhausted to follow them. They found some provisions, but neither stimulants nor clothes had been left, and the scanty stores were soon consumed.

With starvation staring them in the face, Burke and King tried to reach a sheep station 150 miles distant at Mt. Hopeless, leaving Wills, who was unable to walk, at the depot. Some friendly natives that they met on the way fed them with nardoo seed, but it did not nourish them, and they found Mt. Hopeless like a mirage, never to be reached. Burke died on the way back, and King returned to Cooper's Creek to find that Wills had died during his absence. He managed to exist for three months with a native tribe of the region where he was discovered by the Howitt rescuing posse. Meanwhile the Cooper's Creek party, marching south, came upon the delinquents from Menindie, who had rested for three months instead of three weeks, coming north with plentiful provisions. Joining forces, the entire force retraced their steps to Cooper's Creek, but by some infernal whim of fate arrived at the time when Burke and King were on their way to Mt. Hopeless; and supposing their leaders were really lost they turned their faces to the colonies once more.

When it was made known in Victoria that Burke and Wills were lost no less than four expeditions were

immediately organized for their relief. Mr. Howitt, who found King, the only survivor of that ill-starred company, gave a vivid recital of the discovery. Not far from Cooper's Creek, he said, he came unexpectedly on a group of blacks beside a camp fire. On seeing him they scattered into the bush leaving one figure alone. This creature, ragged as a scarecrow, stood staring wildly at the white man for a moment; then fell on his knees. Howitt rode up to him. "Who are you?" he asked.

"I'm King," answered the man. "I'm the only one left." He reported Burke and Wills to have died some months before. Their remains were disinterred; and the day that McDouall Stuart returned in triumph to Adelaide from his successful expedition, the bodies of Burke and Wills were carried into the same city.

Of the other search parties, Mr. J. McKinlay, sent from Adelaide by the South Australian Government, crossed the continent from the mouth of the Victoria, the remarkable formation of whose banks he was the first to discover, by a route a little to the east of the one taken by Burke and Wills. He returned to Adelaide through Southern Queensland. Mr. Landsborough, sent out by the Victorian Government, travelled from the mouth of the Albert River on the north through the valley of the Gregory and the regions to the south of it, exploring the Flinders and Victoria rivers on the way, and reached Melbourne on the southern coast. These expeditions were of the great-

est importance, as they familiarized the coast settlers with the interior of the continent, lessening by frequent crossing the terrors of the desert.

Section 3. The islands of New Zealand, lying but a short distance to the south-east of Australia, are more closely allied, both in climate and inhabitants, to the Sandwich and Samoan Islands than to their mother continent. They are three in number, namely, North Island, South or Middle Island, and Stewart Island. In the days when Cook first landed on these shores they owned far more pleasing appellations. An old chief told the Captain the native names. North Island was "Eaheinomawe," which in the Maori tongue means "a thing fished out of the sea by Maue;" Middle Island was "Tewahi Pounamu," "the place of the green stone," and small Stewart Island still retains its native name of Rakiṃa.

Cook reports that on approaching North Island for the first time, he beheld rising abruptly from a narrow coast-valley a chain of hills, behind which snow-capped mountains gleamed above the dark forests of the foothills. Upon attempting to land at Turanga, he was attacked by the New Zealanders. The few men whom he sent ashore were killed, and not content with this, the aggressive savages began pushing off in their war canoes toward the ship, hurling light spears and hatchets of green talc.

The suspicious and warlike character of these bold brown men was a great tribulation to the early explorer, and the cannibalism prevalent was a horror

that long kept the interior unexplored. But the coast was thoroughly charted and surveyed by Capt. Cook; and, by his steady insistence and unfailing firmness of temper, he won in great measure the confidence of the New Zealanders.

Cook's coast surveys were completed by Captains Stokes and Drury of the Royal Navy. But the first men to make a breach in the barrier built up by fear between New Zealand and the outside world were the sealers, who found plentiful seal along the coast of Middle Island, and later, when these had been killed off, established whaling stations for the purpose of killing the female whales which came into the coast bays in great quantities in the breeding season. These fishermen settled on islands off the southern shore, intermarried with the Maories, and lived peacefully among them.

The pioneers of the interior were the missionaries. In 1814, Marsden was the first of a long procession of zealous and courageous men, who made their churches centres of settlements all over North and Middle Island. And if the conversion of the natives to the Catholic, Episcopal or Methodist faiths was not permanent, at least their conversion from cannibalism was.

It was these priests who discovered the intelligence and adaptability of the Maories, which transformed the warlike savages into a peaceful people who made settlements, cultivated the soil, and trafficked with the settlements along the coast. When

Darwin in 1835, in his voyage with Capt. Fitzroy of the *Beagle,* journeyed across the islands he was much impressed with the high state of the civilization of the natives. Only along the banks of the southern rivers, the Ruamahunga and the Matama, they maintained the customs and rites of their fathers.

Five years after Darwin's expedition Dr. Dieffenbach, naturalist to the New Zealand Company, explored, in company with Capt. Symonds, the interior of Auckland, and ascended Mt. Egmont, though at the time the mountain was "tapu." Dieffenbach made expeditions up the northern peninsulas of the island, and from here turned south with the intention of examining the valleys of the Waipa and Waikato.

Extending from Mt. Egmont on the north-west coast to White Island in the Bay of Plenty is a double chain of extinct volcanoes, and into this region he travelled, accompanied by Lieut. Best. First passing through the Waipa Valley, which he found to be very fruitful and well cultivated, they plunged into the mountain forest, where the mighty kauri pines towered above their heads, and the rata tree sent out its sinuous creepers, like ladders to scale the forest, and in the bottom-land the giant ferns spread their green fronds over the treacherous black bogs.

Out of this sombre gloom they stepped suddenly into a devil's kitchen,—the Waikato Valley, the heart of the volcanic region. The rock floor steamed at every fissure; its jets of milky mineral water leapt into the

air, higher than the conical pumice hills which rose in terraces from the valley bottom. At the foot of steep white cliffs pools of vermilion-coloured mud boiled and bubbled like witches' cauldrons. It was an Inferno above-ground. The explorers felt that the rock they trod was liable to burst asunder at any moment.

In the midst of this hissing, spouting, steaming valley lay Lake Taupo, a calm, gleaming sheet of blue, and across it to the south towered the volcano Tongariro. It was a sight to be long remembered. In very truth it would seem that in this paradise of the south sea all the phenomena of the earth's surface were gathered together.

From the Waikato Valley Dieffenbach travelled through the mountains by a number of lakes, fifteen at intervals from Taranaki to the coast at Turanga, and thence through the Thames Valley to Auckland, thus ending a journey of most remarkable value to the geological world, because of the finding of the Waikato Valley.

At the time of Dieffenbach's expedition, in 1840, there was a treaty signed at the Bay of Islands, in which the native chiefs swore fealty to the British crown. From that time forth the exploration and survey of New Zealand was carried on systematically by a colonial survey company under James Hector and Sir Julius Von Hast.

Von Hast himself made a number of dangerous journeys into the Alps of Middle Island, the country of glaciers, as North Island is the land of volcanoes.

In 1860 he set out from Nelson, and crossed the mountains through a beautiful lake region, where the tributaries of the Grey and Buller rivers have their sources, and navigated both rivers to the sea, demonstrating that the trail across the northern mountains was not so difficult as had been supposed, besides adding to the chronicles of the survey much valuable information concerning the botany, zoology and geology of the southern part of the province.

In the following year, 1861, he explored the Canterbury Mountains, and navigated the Rangetata and its tributaries at some peril to himself and his party, as the rivers of these islands are given to sudden floods, caused by the melting of snow in the mountains. Von Hast led a charmed life, for not only did he successfully canoe on these waters, but traversed a mountain range as dangerous, with its precipitous peaks, rapid torrents, and crevassed glaciers, as the Alps of Switzerland.

Ascending the highest peak in the Mt. Torlesse Range, and seeing the marvellous panorama spread out before him, the practical scientist was completely carried away by the magnificence of the spectacle. He looked across the summits about him, away to the snow caps of the Southern Alps, to the great Tasman Glacier, and the Moorhouse Range, standing up snowy and solitary above the dark forests of pine that clothed the cañons, that long stood an unscaled barrier to the valleys of the west.

Von Hast was unable to find a route across them,

and for years the goal of the New Zealand explorer's ambition was to find the much desired road. Whitcome and Charlton Howitt both lost their lives on this quest, their frail canoes perishing in the rapids of the mountain rivers. Not until as late as 1896 was the problem finally solved by Edward Fitzgerald.

Fitzgerald's purpose was to discover a tourist route that horses could travel, and by which the gold-diggers could get supplies and send ore to the coast. With his Swiss guide Zurbriggen, he scaled Mount Sefton (10,300 feet), the Matterhorn of the southern Alps. From here he was able to see the route by which he could cross, and from here with the guide he set out over the divide. A surveyor's camp in the heart of the mountains saved them from starvation, and they reached the coast by following a river course to the sea at Gillespie's township.

From this point they recrossed by way of the Fox and Tasman Glaciers, escaping miraculously from falling over a cliff in the fog, and suffering terribly from thirst, cold and hunger. During this trip Fitzgerald crossed ten glaciers, including the three largest, the Fox, Tasman and the Franz Joseph. He declared the New Zealand Alps to be even more dangerous than those of Switzerland, since they are as yet unmapped, and more uncertain as to climatic changes.

CHAPTER XXVIII.

IN THE HEART OF AUSTRALIA.

Section 1. We are now come to a period in the history of Australian exploration when the continent had ceased to be an uncharted wilderness. The entire coast was well known. Queensland, Victoria, New South Wales and the Adelaide River district had been thoroughly explored, and much of the land utilized for purposes of grazing and agriculture. Vast herds of sheep pastured in the south, east and north-west; and where the gold mines of the Kimberley had once buzzed like hives were fields of grain and prosperous farms. Even the desert was stripped of its greatest perils when in 1870 it was spanned by the telegraph line from Adelaide to Port Darwin. The stations along its route became depots of supply for the "overlanders" of the seventies, and the fear of drouth was thereby lessened. Nevertheless there were tracts of desert in the south and west that remained untrodden, and brave men were still to suffer pangs of hunger, thirst and sickness in the work of extending the British Dominion.

One of the first of these, Ernest Giles by name, in

1872 left Charlotte Waters' telegraph station with the intention of crossing in a westerly direction to the source of the Murchison River. He failed to reach his destination, but he discovered and named Lake Amaden, explored the region to the north of it, finding the country very desolate, with low barren mountains that lessened in height as he travelled west. The following year he made another expedition some two hundred miles to the south of his previous course, over the same arid wastes of sand and spinifex, whose sharp spines made walking an agony for men and horses.

Turning north for 100 miles he came upon a green oasis in the hills, but obtaining water from the desert springs was a very difficult matter. It oozed out of the earth through the mud, and had to be strained and boiled before it was fit to drink. He was able to fill only a few of his water bottles, and fearing to go forward with such a scanty supply he retraced his steps; but the road back was longer than he thought, and he nearly died from thirst on the way.

In 1875, this indefatigable explorer again crossed the desert, this time from west to east, 300 miles to the south of his first track, making three trips in all, twice crossing the desert and exploring half of the intermediate distance between the two routes.

Simultaneously with Giles's first expedition, Gosse had set out in the same direction. He did not go as far, but he discovered Ayre's Rock, a granite pyramid 1000 feet in height, not far from Mt. Olga. The fol-

lowing year John Forrest, who, in 1869, had made his first exploration in the search party sent out after Dr. Leichhardt, under the patronage of Baron von Müller, started from Champion's Bay on the west coast for the purpose of exploring the river district of the north and west to the overland telegraph line. He discovered and named the Glengarry Range, and crossed the Murchison watershed, where he found a region of good springs. From here he entered the desert, and saw nothing but sand, spinifex and dry water holes, until he reached the overland telegraph line.

In this same year (1872) Colonel Warburton, who in 1857 had investigated the Torrens district, was put in command of an expedition which left Adelaide for Perth, by way of Central Mt. Stuart. Leaving Alice Springs, one of the telegraph stations, in April, Warburton's party struck west over the low ridges of shifting sand, so laborious to climb, under a terrible tropic sun, with water holes far between, and very scanty fodder. Had Warburton not taken camels instead of horses it is doubtful if he would ever have brought his company through alive. As it was, they reached the head of the Oakover River just in time to save themselves from dying of thirst. And here, on the 29th of December, they were found by a relief sent out to look for them.

Colonel Warburton's journey demonstrated the value of camels in desert exploration. They thrived on the poor vegetation, and were able to feed on

shrubs that grew out of the reach of the horses and bullocks, besides being able to go a long time without water.

Following Warburton, a number of lesser expeditions were busy extending the knowledge of the territory of the north and west. In 1879 Winneke traversed a large tract of land between Alice Springs and Adelaide, which he found to be alluvial and well adapted for pasturing cattle. Again, in 1883, he explored the western border of Queensland. In 1878 Ernest Favenc began his career as an explorer by surveying a route for a railway, from Blackall in Queensland to Port Darwin on the northern coast. And again in 1888 he examined the country along the Murchison and Gascoyne rivers. In 1883 David Lindsay surveyed the Arnhem territory, and the next year Harry Stockdale, an experienced bushman, explored the shores of Cambridge Gulf, discovering a well-watered country drained by the Lorrimer and Buchanan rivers.

Section 2. In 1891 David Lindsay, who had first surveyed in 1883 in Arnhem Land, in company with Wills and Streichs explored a section in the southern part of West Australia. In 1894 the Horn Expedition, under the leadership of Mr. Winneke, travelled through the Great Desert with the purpose of making scientific examination of the country from the Oodnadotta to the McDouall Mountains, and of collecting information concerning the aborigines. They inspected Mt. Olga and the shaft of Ayre's

Rock, taking photographs of all the well known geographical features of this section.

Following Winneke in 1895 Wm. Carr Boyd travelled the route between Lake Cary and Warina Station on the Northern Railway of South Australia. Two lakes were discovered, of which he called one Lake Flemming, and the other Von Hast, in honour of the Baron. Crossing the Warburton Mountains, he struck Forest's Barlee Springs route, whence he reached Warina, four hundred miles distant. In Mr. Boyd's opinion, the sections which at present are arid desert, could be transformed into a good grazing country, if the various sinks and springs were opened.

Another notable expedition of this same year was that led by the Honourable David Carnegie. With a company of three white men, one native boy, a train of pack camels, and provisions for nine months, he left Coolgardie on July 9th, 1896. A few miles out they met some stockmen at Doyle's Wells, and these were the last white faces they saw until they reached the Kimberley. A short march from Doyle's Wells they found themselves in the desert, which continued unbroken to Mt. Worsnop. They saw nothing but endless stretches of sand, as far as the eye could reach, with here and there a lone gum or acacia tree stunted by the barren soil. Now and then a white rock cliff or low table-land of sandstone broke the endless monotony, and occasionally they crossed a creek bed, dry, but filled with a luxuriant growth of grass from the recent rains.

Leaving Mt. Worsnop behind them, they entered the dreaded country of the spinifex. Now and then the waste was broken by a belt of bloodwood timber, but as they drew further west these grew less frequent, the undulations of sand swelled higher, and water was harder to find. Across the length of the desert it was one long fight for water. Reaching the Kimberley at last at Mt. Bannerman, they followed the Margaret River to its junction with the Derby, and along its shores to Hall's Creek, the official centre of the Kimberley gold fields. This gold country, discovered in 1882 by Hardman, was very soon worked out, but it continues to be one of the finest pastures for cattle in Australia.

On his return trip Carnegie passed through the Stuart Creek region, to the east of his first trail, and came home to Coolgardie by way of Gregory's Salt Sea, the Winneke Hills and Lake McDonald, having covered 3000 miles, one half of which was unexplored territory. His investigations confirmed the opinion that, because of the scarcity of water, a direct route from the Murchison to the Kimberley country is impracticable.

Section 3. At the close of the nineteenth century we find Victoria, Queensland, and New South Wales, the eastern half of the continent, all known territory, and more or less settled. It is only in the Province of West Australia, which occupies more than one third of the continent, that we shall find the unknown country that is still a blank on the map.

In doing this it will be well to consider that this great western province is divided into six districts, the South-west, Eastern, Eucla, Gascoyne, North-west and Kimberley divisions. Of the Eucla, the most southern of all, only a portion has been explored, but good pasture lands are known to exist there, and there are a few sheep stations. One or two artesian wells have been obtained by boring to a depth of 500 feet, and if more could be opened up the country would become very fruitful, as the Australian soil, far from being poor, responds to moisture with luxuriance.

The central part of the Eastern Division is perhaps the most dreary part of all the desert, and of it there is very little known. On its western borders the salt marshes of the Lake Torrens district lie among low sand hills and granite rocks. The other four sections are well watered, productive, and frequently travelled, though in some parts the terrible heat renders existence almost unendurable. It is believed by many scientific men who have made investigation in the central part of the continent that, with sufficient water, the Great Desert would become an excellent grazing ground for the herds of sheep and cattle that are cropping the plains of the south and north; but how to undertake such an enormous system of irrigation as this would involve is a great question in the colonies to-day.

PART NINE.

ANTARCTIC EXPLORATION.

CHAPTER XXIX.

EARLY ANTARCTIC EXPLORATION.

Section 1. In these opening years of the twentieth century it is agreed by geographer, scientist and mariner alike that the mystery of earth, at once most difficult of solution and most lacking in all elements that could attract other than the purely scientific explorer, lies hidden behind the ice barriers of the Southern Polar seas. Daring adventurers, tempted by the myth of a great Antarctic continent, have sought the haunt of this geographical sphinx, only to turn back, baffled, from the icy walls that guard her stronghold, bearing of the eagerly desired knowledge but a few scattered crumbs to serve as a basis for manifold theories. It is only within the last century that expeditions fitted out solely for the purpose of scientific research have succeeded in wresting from the dreary Antarctic seas spoils worth the

trouble and hardship of the long, monotonous struggle with floating ice, dense fog and driving snow.

Although the existence of a large continent in the southern seas was unquestioned, the latter half of the sixteenth century was well advanced before any definite effort was made to discover its situation and extent. It is said that, in 1507, an expedition sent from Portugal to explore the coasts of the newly-discovered Brazil sailed far to the south, where the irrepressible Amerigo Vespucci, who was one of its members, claimed to have sighted land somewhere in the vicinity of the island now known as South Georgia. A flavour of truth was added to Vespucci's florid account of his discovery by the fact that he described the land as bleak and inhospitable, and unfit for human habitation on account of the cold. Genuine or not, the discovery was barren of results other than to strengthen and perpetuate the prevailing belief in the southern continent, of which Vespucci supposed the land he had sighted to be a promontory.

Other expeditions made to the Brazilian coast began to arouse popular interest in the mysterious *Terra Australis.* In the charts of later geographers it had been severed from all connection with Asia and Africa, but South America was supposed to be separated only by a narrow strait from an imaginary land designated on the maps as *Brasilie Regio,* a continent formed by the extension of Tierra del Fuego into a land stretching far into high southern

latitudes and the prolongation of its coasts to encircle the globe at the South Polar zone. The discovery of Cape Horn by Sir Francis Drake should have exploded the idea that Tierra del Fuego was merely a peninsula of the southern continent, but even his clear account of the southern extremity of South America was distorted to suit the favourite delusions of contemporary geographers concerning the regions surrounding the South Pole.

Section 2. It was not until 1567 that an expedition was sent out with the avowed purpose of discovering and verifying the existence of the *Terra Australis Incognita.* Lope Garcia de Castro, the governor of Peru, was the originator of the enterprise, and his nephew, Alvaro Mendana, was placed in command of the expedition. It deserves mention only through being the initial attempt, as it appears that no discovery was achieved.

In 1599, however, the first glimpse of the frozen islands washed by Antarctic seas was vouchsafed to the bold Dirk Gerritz, captain of the yacht *De Blyde Boodschap.* A Dutch squadron under Admiral Jacob Mahu was engaged in the patriotic occupation of harrying Spanish possessions in the south Pacific, when a storm dispersed the fleet just to the west of the Straits of Magellan and drove the stout little yacht as far south as latitude 64° S., where Gerritz sighted a coast with lofty, snow-clad mountains. Although the discovery was not followed up, and the land has been rediscovered by later and noted ex-

plorers, the island group to this day bears the name of the Dirk Gerritz Archipelago.

By slow degrees the most flagrant errors on contemporary maps were rectified, as one ship after another sailed or was driven toward the higher Antarctic latitudes. Nearly forty years after Drake's discovery and exploration of the southern coast of Tierra del Fuego, the true account of this part of his expedition was verified by the experience of Schouten and Le Maire, two Dutch mariners who set out to find a passage south of the Straits of Magellan, then controlled by the Dutch East India Company and held for the exclusive use of Dutch merchantmen. The adventurous sailors followed Drake's track through the straits which were named by them Le Maire, and thoroughly examined the coast of Tierra del Fuego, naming its southern extremity Cape Hoorn or Horn.

A fresh error which arose when Abel Tasman, the greatest navigator of the seventeenth century, set out in 1642 in search of the southern continent, was rectified a year later by another Dutchman named Brouwer. Tasman sighted the southern island of New Zealand a few weeks after his discovery of Van Diemen's Land, and, supposing it to be connected on the east with the Straits of Le Maire, he named it Staaten Land. Brouwer, soon after discovering the real extent of the South American Staaten Land, removed the last trace of any connection between South America and the mythical southern continent.

After the rediscovery of South Georgia by Antonio de la Roche in 1675, there were no further discoveries among Antarctic regions for sixty-two years, the only voyagers in high southern latitudes being the buccaneers, who made it their chief business and pleasure in life to harry the colonies of Spain.

Section 3. The business of South Polar exploration was undertaken in earnest in 1738, when the first real Antarctic expedition was sent out by the French Compagnie des Indes. This was one of but two exceptions in the history of South Polar exploration, in that the object of the voyage was to search for a supposedly fertile and populous southern country, presumably with the intention of conquest and colonization. The ships *L'Aigle* and *Marie* were fitted out and placed under the command of Lozier Bouvet. After cruising about among the icebergs for a time with little result, Bouvet reached longitude 4° E. and latitude 54° 20′ S., where he sighted high, snow-covered land. The ships were unable to approach near enough to effect a landing, but closer inspection revealed that the more level parts were free from snow and covered with the high, spiky clumps of tussock grass, which gave the country a delusive appearance of being well-wooded. Bouvet believed it to be a promontory of the great southern continent, and, like a good Catholic, he commemorated the day of its discovery by naming it Cap de la Circoncision. In later years, Cook, Ross and Moore

all had ample reasons for believing this small group of volcanic islands to be indeed a part of the mythical *Terra Australis Incognita,* for all three searched for it in vain. Twice rediscovered by whalers who stumbled upon them accidentally, the elusive isles were each time given a different position on the globe, and to each of the three discoverers they seemed to present a different aspect. Even the number of islands in the group varies in the different accounts, yet the main facts in each case establish its identity with Bouvet's discovery. Had not accurate observations been taken, and on one occasion a landing effected, the hardy mariners who sailed the southern seas might well have been excused for declaring the strange group to be a figment of the imagination, based on an apparition of cloud-banks and floating ice.

Section 4. After a lull of thirty years, active interest in Antarctic exploration was renewed in the latter part of the eighteenth century. With the advancement of the times and the increasing interest in the study of natural science, the motives for exploration were now purely for the extension of knowledge of all habitable and uninhabitable parts of the globe. Expeditions were sent out accompanied by staffs of scientists and equipped with every facility then known for the investigation of natural phenomena, in order to increase the knowledge of such sciences as sociology, ethnography and biology, and to determine the distribution of land and water in the un-

frequented quarters of the world. These expeditions, particularly that of Captain Cook, were the direct forerunners of the voyages of discovery of the nineteenth century, and without some account of them the story of nineteenth century discovery would neither be intelligible nor complete.

In 1771, Marion du Frezne and Yves Joseph de Kerguelen-Tremarec set out from France almost simultaneously, in command of two different expeditions sent to the southern seas to renew the search for the southern continent, and, when found, to study its products, natural resources, inhabitants, etc. They shared the failure of their predecessors to find any indication of the long-sought continent, but were in a measure consoled by the discovery of a few snow-clad islands. Marion sighted the first one, which he hopefully christened Terre d'Espérance, and later discovered a group, upon one island of which he landed, naming it Isle de la Prise de Possession. Kerguelen sighted the land which now bears the name of Kerguelen Island, but did not stop to ascertain the extent of his discovery. These two groups, which both lie between parallels 45° and 55° S., form the outposts of the Antarctic island groups.

Section 5. A year later, the famous mariner James Cook was chosen by the British Government to find and determine once for all the nature and extent of the great southern continent. Captain Cook was eminently fitted for this task by reason of his wide experience in Arctic exploration, and of the

valuable services rendered by him in establishing the outlines of New Zealand and Australia during his first circumnavigation of the world in 1769.

With the ships *Adventure* and *Resolution,* the latter of which was a veteran in Arctic ice-fields, he sailed south from Cape Town in 1772, and two months later crossed the Antarctic Circle for the first time in the history of South Polar exploration. Now, also for the first time, appear in the record of voyages to high southern latitudes accounts of that dreary waste of pack-ice, surmounted by gigantic icebergs, which forms an almost impenetrable barricade around the Southern Polar seas. Through perpetual fog and mist and the crush of grinding ice Cook struggled on until, in latitude 67° 17′ S., and longitude 39° 35′ E., he caught sight of a great table-land of ice, the sheer façade of which descended vertically into the sea. Although he did not know the full significance of his discovery, Cook had been vouchsafed the first glimpse ever accorded to human eye of one of the great ice barriers which bulwark the South Pole, and from which glaciers and inland ice break off in all directions into the sea. No actual discovery of land was made, and, after a vain search for Kerguelen Island, Cook retired to more genial latitudes to give his men a breathing-space before renewing his attack upon the shifting fields of ice. By the distance he had sailed on and about the 60th parallel of latitude, Cook had proven the non-existence of a continent to the south of the Indian Ocean,

so his next voyage was directed to the southernmost waters of the Pacific.

Again he dashed into the realm of ice and mist and dreary grey waters, only to retreat, baffled by the insurmountable difficulties that beset his path. Returning once more to the attack, and entering the familiar waste, he managed to penetrate to latitude 71° 10′ S. on longitude 106° 54′ W., by far the highest southern point ever reached at that time or for long years after. Before him he saw what were to all appearance lofty mountain chains of ice rising steadily toward the south. From the conformation of these, he conjectured that they were connected with land which stretched away to the Pole itself, and as this theory is supported by the opinion of the most astute of later explorers, it is quite possible that Cook attained after all the object of his search, and saw before him all there was to see of the long-sought *Terra Australis Incognita.*

Once more Cook retreated north to New Zealand, and thence started on a voyage to Cape Horn, resuming his old tactics of sailing along between parallels 50° and 60° S. in order to prove the existence or non-existence of any extensive mass of land in the southern waters of the Pacific. He reached Tierra del Fuego without encountering anything that resembled a continent, and surveyed the coasts of that wild land and of Staaten Land. Sailing westward, he rediscovered for the third time the large island of South Georgia and made an accurate survey of the north-

east coast, giving the island the name it now bears, with serene British disregard of the fact that it had been named Isla de San Pedro by a former discoverer.

From the neighbourhood of South Georgia Cook sighted a distant chain of mountainous, ice-clad islands, to which he gave the name of Southern Thule. This name is now borne only by the southernmost island of the chain, which is known as the South Sandwich group. After a vain search for the Bouvet Islands, Cook turned his back at last on the higher southern latitudes and shaped his course for the Cape of Good Hope, returning thence to England after having completed his second circumnavigation of the world.

In its results, this first intelligently-planned series of voyages in and near the South Polar zone ranks in importance with the voyages of Columbus, Magellan and Vasco da Gama as regards new knowledge obtained of the surface of the earth. By his circumnavigation of the globe near its southern extremity, Cook aided materially in defining the limits of its habitable countries. He not only discovered that the preponderant surface of the southern hemisphere consisted of sea instead of land, but was the first to report the hardships and perils of navigation in the frozen polar seas and the character of the ice-covered islands which he found in place of the great southern continent. The difficulties he had encountered appeared so insurmountable in view of any future at-

tempts to reach still higher latitudes than he had attained, that Cook, in his own narrative of his voyages, laid the South Polar regions under a ban which aided largely in dampening the ardour of explorers until the early twenties of the next century. According to him, the Antarctic seas embrace only "countries condemned to everlasting rigidity by Nature, never to yield to the warmth of the sun, for whose wild and desolate aspect I find no words: such are the countries we have discovered: what then may those resemble which lie still further to the south? It is reasonable to suppose that we have seen the best, being the most northerly. Should anyone possess the resolution and the fortitude to elucidate this point by pushing yet further south than I have done, I shall not envy him the fame of his discovery, but I make bold to declare that the world will derive no benefit from it."

Section 6. For another thirty years after Cook's last voyage, the Southern Polar seas were abandoned to the harvesting of American and English seal fishers. Voyages of discovery in both Arctic and Antarctic regions ceased to inspire public interest, as the Napoleonic wars and the general political situation in Europe absorbed the attention and exhausted the resources of England and France to such a degree that exploring expeditions destined primarily for the advancement of knowledge were thrust aside by more pressing demands upon public and private funds.

One noteworthy incident, however, relieved the general inaction. This was the rediscovery of the Bouvet Islands, together with the first appearance in Antarctic seas of the whaling vessels of the firm of Messrs. Enderby of London, destined to play by no means an unimportant part in the discovery of lands in the neighbourhood of the South Pole. In 1808, Messrs. Enderby despatched to the southern seas two trustworthy and experienced whaling captains, James Lindsay and Thomas Hopper, in command of the *Snow Swan* and her consort, the *Otter*. As a whaling expedition, the voyage of the *Snow Swan* and *Otter* does not appear to have been a marked success, on account of the slight commercial value of most species of Antarctic whales, but the ice-clad mountain which Lindsay sighted looming spectrally through the mist one October day, and which was also seen by Hopper four days later, proved to be the mysterious Cap de la Circoncision of Bouvet. Both captains endeavoured to effect a landing, but were prevented by the ice, and, after cruising about the islands for three days in search of an available harbour, they sailed away.

Section 7. Chance led also to the finding once more of the Dirk Gerritz Archipelago, discovered by accident two centuries before, and hidden ever since from explorers. It is said to have been discovered in 1812 by American seal-hunters, and used by them as a sealing-station, but desire to retain the

exclusive use of so valuable a discovery led them sedulously to conceal its existence.

In 1819, however, an English whaling captain named William Smith ventured far to the south of Cape Horn on a voyage from Rio de la Plata to Valparaiso, and had the satisfaction, so dear to the Anglo-Saxon heart, of sighting an unknown land in latitude 62° 30′ S. Captain Smith could not then stop to investigate the extent of his discovery, and on his return voyage, six months later, he merely verified, by closer inspection, the existence of a chain of islands which he named the South Shetland Isles.

Full of his discovery, he hastened back to Valparaiso, where he reported what he had seen to Captain Sheriff, commander of the British frigate *Andromache.* Mr. Bransfield, one of the officers of the *Andromache,* was appointed to return with Captain Smith in order to determine the outlines and extent of the new islands, a task which he executed with the greatest thoroughness and accuracy.

Smith's achievement in Antarctic discovery was the first of the nineteenth century, and it was no sooner made known than the English and American seal-hunters came in force and extended the explorations not only over the whole of the South Shetland group, but crossed Bransfield Straits to Palmer Land and Trinity Land, two important islands of that portion of the archipelago lying to the south. Captain George Powell, of the sloop *Dove,* also went far enough to the east to discover the South Orkney Islands, which

have always remained among the least-known groups of this region, being mountainous, heavily glaciated, and surrounded by rocky islets, well-named The Inaccessible Rocks.

Section 8. Contemporary with the seal-hunters was an expedition commanded by Fabian Gottlieb von Bellingshausen, who sailed from Kronstadt in 1819 in command of the Russian man-of-war *Vostok* and her consort, the *Mirny*. Bellingshausen was commissioned by Czar Alexander I. to push as far south as possible, and his voyage was by no means barren of important results. In a voyage lasting two years, he crossed and recrossed the Antarctic Circle six times, and sailed over two hundred and forty-three meridians of longitude beyond 60° S. latitude, forty-six of them within the Antarctic Circle, thus narrowing considerably the area in which the existence of a southern continent was possible. He also discovered a group of islands adjacent to the South Sandwich group, which he named the Traversey Islands in honour of the Russian Minister of Marine. One of these, Sawadowskji Island, was crowned with a volcano in active eruption. Sailing on to the Candlemas Islands, as Cook had named the northern portion of the South Sandwich group, Bellingshausen made an accurate survey of the coasts, proving them to be all small islands and not part of a continuous coast, as supposed by Cook.

The main object of Bellingshausen was to follow the tactics of Cook in circumnavigating the polar

seas at the highest possible latitude. He went south until, at latitude 66° 53′ S., he was stopped by the same impenetrable barrier of ice that had checked Cook's progress just five degrees short of the coast now known as Enderby Land. After battling with the pack-ice for months, advancing and retreating, Bellingshausen was rewarded by the discovery of a steep and lofty island in latitude 68° 57′ S. and longitude 90° 46′ W., which he named Peter I.'s Island. Steering east on or near the same parallel, he sighted a coast which seemed to extend to the southwest, and which received the name of Alexander Land. The coast was seen to be elevated and snow-clad, and, although the ice prevented the approach of Bellingshausen nearer than forty nautical miles, it was afterwards found to be a continuation of Graham Land, the largest mass of land yet discovered south of Drake's Strait.

Section 9. In 1822, a voyage to the South Polar seas that resulted in a discovery of the first importance was made by James Weddell, a seal-hunting captain who left London with the brig *Jane* and the cutter *Beaufoy*, and who broke the ban laid over exploration in the high southern latitudes by not only penetrating three degrees further south than Cook, but by breaking through the zone of pack-ice into an open sea that lay beyond. He also demonstrated that the newly-discovered lands in these latitudes nowhere reached to 30° E. longitude.

Weddell steered straight for the South Orkney

Isles, which he had seen the year before, and, after an accurate survey of the coasts, he shaped his course for the South Sandwich Islands, thus ascertaining that no more land lay in the region between the two groups. Turning south, he crossed the Antarctic Circle, and at latitude 68° 30′ S., he found himself hemmed in by the ice-pack and his ships menaced every moment by countless icebergs. Blinded by snow and fog, he groped his way through the grinding, crushing ice, holding with dogged persistence to his southern course until, in latitude 72° 38′ S., he suddenly found himself sailing under clear, sunny skies, in a sea entirely free from ice and covered with birds, especially stormy petrels. Delighted with his discovery, so far-reaching in its significance to future voyagers, Weddell eagerly pushed on; but, in latitude 74° 15′ S., the highest point yet attained by any Antarctic voyager, the failure of provisions and the conditions of his ships and crews compelled him reluctantly to turn back. He sighted no land in the open sea now known by his name, and saw only four small icebergs. At the Circle he again encountered the belt of pack-ice, which extended to the sealing islands, hemming them in with such an impenetrable barrier that he was obliged to return to the north without the cargo of sealskins which had formed one of the objects of his voyage.

Section 10. The first purely scientific expedition to the regions surrounding the South Pole was undertaken in 1828, when the English frigate *Chan-*

ticleer, with Captain Foster in command, was sent to the far south in order to enable Edward Sabine, the eminent physicist, to reach the high southern point necessary for completing his observations on the pendulum and on magnetic variations that he might secure data for arriving at an accurate calculation of the form of the globe;—investigations which had already been carried on in the Arctic regions and over the whole area of the Atlantic Ocean.

Two years later a much more important voyage, viewed in the light of additions made to the geographical knowledge of Southern Polar regions, was undertaken by direction of Messrs. Enderby, who once more commissioned an experienced navigator to search for whales and seals and new lands among the southern ice-packs. John Biscoe was the man chosen for this venture, and he was given command of the brig *Tula,* which had for consort the little cutter *Lively.* Biscoe was especially instructed by his employers to make all possible discoveries in the Antarctic seas, and so well did he perform his task that he was given high honours by the Geographical Societies of London and Paris for having circumnavigated the globe at a high southern latitude, and discovered the most extensive coast yet found within the South Polar Circle.

Biscoe went first to the Falkland Isles and thence turned east, searching for a group of islands said to have been seen by three Spanish ships in the eighteenth century and named the Aurora Isles. No such

group appeared in the waters traversed by Biscoe, and he shaped his course for the South Sandwich Islands, but failed to penetrate the heavy field of ice which lay to the south of them. His progress was hindered almost constantly by ice, but he worked his way along, almost yard by yard, until at last he found himself in front of Cook's great ice wall, and barred from further progress south as Cook had been. He crawled along the edge of the barrier until he attained longitude 43° 54′ E. on latitude 66° 2′ S., where land was clearly seen, although the heavy field-ice barred approach. The new coast was named Enderby Land by Biscoe, in honour of his employers, but the ice-barrier in front of it has so effectually shielded it from all close investigation that it has remained to the present time one of the least known of the Antarctic countries.

Biscoe sailed along to the east, and twice sighted land which was undoubtedly a continuation of the same coast. Driven by exposure and hardship, and the approach of the southern winter, Biscoe retreated as far as Tasmania to give his crews a chance to recuperate, but with the return of spring he once more turned his prows to the south. After crossing the sixtieth parallel he resumed the course he had held so steadfastly to the southeast, and slowly threaded his way among innumerable icebergs until, on longitude 68° 20′ W. and latitude 67° 15′ S., he saw an island which he called Adelaide Island. It is one of the chain which now bears the name of the Biscoe

Islands, and which lies in front of Graham's Land. Biscoe succeeded in landing on the west coast of Palmer Land, and then returned to England, having succeeded in spite of innumerable hardships in his purpose of once more circumnavigating the South Polar zone.

Section 11. In 1833, a continuation of Enderby Land was discovered by a seal-hunting captain named Kemp, and given his name, but the last noteworthy voyage of this group was made five years later, when John Balleny, another employé of the Enderbys, was sent by them to continue the exploration of unknown parts of the Antarctic seas.

Balleny was placed in command of the schooner *Eliza Scott* and the cutter *Sabrina*. After reaching the far south and the edge of the ice-pack, he pushed on amid the usual dreary and difficult surroundings until, in latitude 66° 44′ S. and longitude 163° 11′ E., he discovered the group of three large islands which now bears his name, although it is sometimes regarded as identical with the Russell Islands, sighted by Ross two years afterward. The Balleny Islands are mountainous and heavily glaciated, and are of volcanic origin. One of them, Buckle Island, rises into a volcano which was in active eruption at the time of Balleny's visit.

CHAPTER XXX.

MID-CENTURY ANTARCTIC EXPLORATION.

Section 1. The great era of Antarctic exploration is without question that of Ross, Wilkes and Dumont D'Urville, the three men who commanded respectively the English, American and French expeditions in the years 1837-38. Of these expeditions, the French was the first in point of time, the American the largest in point of numbers, but the English incomparably the most important as regards valuable results to the scientific world. Dumont D'Urville, although he had twice circumnavigated the world and held a brilliant record as a navigator and skilled hydrographer, frankly hated his task of cruising about the frozen and dreary seas of this utterly uninhabitable zone; his expedition, owing to his utter lack of experience in polar navigation, was ill-equipped for the work in hand; and his men failed lamentably in the courage and stamina required to cope successfully with the hardship and monotony of a long battle with the treacherous and inexorable ice-pack. Wilkes and his men showed plenty of courage and enthusiasm, but not a vessel out of his squadron of five was es-

pecially fitted to stand the strain of the ice, nor were his men inured to the hardships of navigation in polar zones. Their endeavours, consequently, were not always wisely directed, and they accomplished less and suffered more than was needful even in the hard conditions surrounding them.

James Clark Ross, on the contrary, was an experienced polar navigator. The nephew and co-worker of the great Arctic explorer, John Ross, he had accompanied that veteran on the famous voyage during which they had spent four winters within the Arctic Circle, and the younger Ross had himself discovered the North Magnetic Pole. In addition to this, while yet hardly more than a boy, he had shared with Edward Parry the perils of three Arctic voyages, and had so been fitted to become one of the foremost polar navigators of the age. This record, added to the well-earned high standing he had attained both in hydrographic work and in the realm of meteorology and terrestrial magnetism, made him an ideal commander of an expedition sent out to search for the South Magnetic Pole.

The science of terrestrial magnetism was at this time a subject of world-wide interest. Explorations in both polar zones were absolutely necessary in order to obtain results of any lasting value, and scientists felt deeply the lack of a connected and well-defined series of observations in high southern latitudes. The influence of Alexander von Humboldt had been powerful in inducing the Russian Government to estab-

lish the chain of magnetic observatories that extends from the Baltic to Peking, and he was equally indefatigable in his efforts to turn into practical results the interest felt in England and Germany in the same important branch of natural science. At his solicitation the Royal Society of London undertook the task of erecting fixed magnetic observatories throughout the British colonies, and it was to repair the need felt of accurate observation and investigation of terrestro-magnetic elements in the southern zone, that Ross was selected to command an admirably-equipped expedition sent out by the British Government at the instance of the Royal Society to establish observatories in these latitudes and to locate, if possible, the South Magnetic Pole.

Section 2. A year previous to the setting out of the Ross expedition, one destined for the same purpose had left France under the command of Jules Sebastien César Dumont D'Urville. He was given two corvettes, *L'Astrolabe* and *La Zélée,* both having full scientific equipment for the necessary observations. After surveying portions of the Straits of Magellan, he turned south, with the avowed intention of following Weddell's course as closely as was practicable, without going particularly out of his way to discover new land. Reaching the outer edge of the pack-ice in latitude 63° 39′ S. and longitude 44° 47′ W., D'Urville did not make any very vigorous effort to penetrate it, but skirted cautiously along its borders toward the north-east, trying to find a compara-

tively clear passage through the pack. He went as far as the South Orkneys, and then tried in earnest to break through the ice, but failed.

Giving up all further attempts as hopeless, the more that he was inclined to regard Weddell's account of an open sea as a brilliant flight of the imagination, he turned around, and, coming again to the South Orkneys, he made a landing on Saddle Island, which he investigated to some extent, and then steered to the southwest. Within a day land was sighted, at first only a few insignificant rocky cliffs among the icebergs, but more and more as the ships progressed. Toward the east it had the appearance of a low, continuous coast, while on the west appeared three islands. Several mountains were seen to the south, and of these three snow-clad summits of tolerable height received the names of Mount D'Urville, Mount Bransfield and Mount Jacquinot, the last in honour of the commander of *La Zélée*. To the land itself, a portion of the Dirk Gerritz Archipelago, was given the name of Louis-Philippe Land, while an island separated from it by a strait was called Joinville Land. To the west appeared the coasts of Trinity Land, and the broad channel lying between was called by D'Urville Orleans Channel. Five cone-shaped islands, entirely free from snow, were sighted on the western side of the channel and received the name of the Dumoulin Isles, but, the weather being misty and rainy, D'Urville made no attempt at close investigation of any of the new lands seen. He turned north and

shaped his course for Chili, where he spent the next two years in the more congenial task of making observations and surveys in a milder clime.

Hearing then that the Ross expedition had set out in search of the South Magnetic Pole, D'Urville decided that it would redound considerably to the honour of France if he could find it first. So, leaving the harbour of Hobart Town in Tasmania early in January, 1840, he heroically started for the regions to which Ross was bound. It had been calculated by the eminent physicist and mathematician Gauss that the Magnetic South Pole was to be found in the neighbourhood of latitude 66° S. and longitude 146° E. To this point D'Urville accordingly bent his course. Encountering five icebergs in latitude 60° S., he grew very nervous over the prospect of another battle with the dreaded ice-pack. Fortune favoured him, however, for he reached latitude 64° S., without having seen more than the first flock of bergs. The day after, more icebergs appeared, all of the tabular form which indicate the new berg, and therefore the neighbourhood of land, and soon a distant coast loomed dimly through the icebergs which lay before it, evidently not long detached from the parent glacier. Slowly the ships pressed forward through the mass of crowding, echoing ice-hills, until at last they reached a stretch of open water near a coast that extended southwest and northeast to the horizon, with a chain of rocky islets to the west. On one of these D'Urville landed and took possession

for France by unfurling the tricolor, naming the country Terre Adélie in honour of the queen of Louis-Philippe.

Continuing his westward course along the coast for another week, in the teeth of a mass of pack-ice and adverse winds, D'Urville saw to the south a high, perpendicular barrier of ice stretching away toward the west. After sailing along the front of this wall for upward of seventy miles, D'Urville felt sufficiently justified by his observation of it to decide that it was connected with land, and accordingly gave it the name of La Côte Clarie. Both coasts were a portion of the country now known as Wilkes Land. D'Urville claimed it as his discovery, as he was a week earlier than Wilkes in reaching these latitudes, but both were preceded by Balleny, who was the first to see the Clarie coast, but who unfortunately mistook it for a cloud-bank. D'Urville made no attempt to explore further, but returned to France, satisfied with the meteorological and magnetic observations he had made, and resigning all idea of trying to penetrate the pack-ice to the site of the Magnetic South Pole.

Section 3. In 1838, the American Antarctic expedition left Chesapeake Bay for the far south. Lieut. Charles Wilkes, as commodore, commanded the squadron of five vessels which comprised the expedition. He sailed first for Tierra del Fuego, the coasts of which he explored, and thence to Orange Harbour, where he divided his forces for their jour-

ney into the South Polar seas. Leaving the *Vincennes* as a reserve, he himself took command of the *Porpoise* and appointed Lieut. Johnson commander of the *Sea Gull,* purposing to take these two ships to the South Shetland Islands and to Palmer and Trinity Lands. The *Peacock,* under Captain Hudson, and the *Flying Fish,* under Lieut. Walker, were told off to explore the seas west of Graham's and Alexander Land.

The voyage of the *Porpoise* and the *Sea Gull* was uneventful and barren of results, and, after cruising for a time about the Dirk Gerritz Archipelago, Wilkes returned to Orange Harbour with the *Porpoise,* while Johnson stayed for another week to explore Deception Island. He found it to be one of the largest and most interesting crater islands in the world. Shaped not unlike a bracelet, the outer coast forms a rough circle about thirty miles in circumference, while the inner edge, fourteen miles in circumference, encloses an elliptical bay which fills the entire crater and opens to the sea through a channel little more than five hundred feet across.

The other two vessels, though constantly opposed by mist and storm and endangered by the fresh ice that formed rapidly around them in this advanced season, managed to show more results for their voyage. They were separated in a storm soon after leaving Cape Horn and did not meet again until both reached latitude 68° S. and longitude 97° 58′ W. The voyage of the *Peacock* was little more than a

prolonged struggle with storms and floating ice, but the *Flying Fish* was more fortunate. Lieut. Walker had set out with the intention of finding the position in which Cook had reached his highest southern latitude, and succeeded in crossing the seventieth parallel only five degrees east of the meridian upon which the famous English navigator had made his southward dash. More than this, he saw beyond the pack-ice which surrounded him, an appearance of land which strongly indicated the presence of a coast extending to the east of that sighted by Cook. After meeting, the two vessels sailed together to the sixtieth parallel and then parted, the *Peacock* steering toward the Chilian coast, while the *Flying Fish* returned to join the rest of the squadron at Orange Harbour.

Wilkes spent the year 1839 in making scientific observations in the southern waters of the Pacific, and when the southern summer was again at hand he turned once more toward the south, starting this time from Sydney, Australia. The *Sea Gull* had been wrecked a few months before, so the squadron for this voyage included the *Vincennes,* of which Wilkes himself took command. The *Peacock* remained under Captain Hudson, while the *Flying Fish* was now commanded by Lieut. Pinkney, and the *Porpoise* by Lieut. Ringgold. The *Flying Fish* was separated from the squadron soon after the start, but the other three kept on until they reached latitude 66° S. on longitude 157° 56′ E. Here land

was sighted by all three vessels, although it was soon hidden by thick clouds of fog and driving snow. The squadron kept steadily westward, the coast being apparently continuous to the south of them. The snow and fog grew thicker after Wilkes had passed and named several bays and promontories that broke the line of the coast, and when it cleared, the land in sight was the eastern part of Adélie Land, discovered and named by Dumont D'Urville only a week before. A collision with an iceberg so badly damaged the *Peacock* that she was compelled to make all haste in returning to Sydney, where she was soon joined by the *Flying Fish,* the latter ship having done little but wrestle with the ice, fog and flying snow of those most inhospitable seas.

The two remaining ships held to their course and succeeded in pushing through the ice close to the coast of Adélie Land. While they were cruising about among the icebergs, the *Porpoise* suddenly encountered *L'Astrolabe* of Dumont D'Urville's expedition, but the two ships held no communication. Wilkes, in the *Vincennes,* sighted the ice wall of the Clarie coast and followed it along until land and ice wall veered suddenly to the south. Attempting to follow, he was compelled to turn back on account of the steadily-increasing number of icebergs. He then resumed his course to the west and soon sighted land again. Holding steadily to the long coast of Wilkes Land, he discovered numerous bays and promontories, most of which he named in honour of the officers of his command.

According to the measurements of its surveyors, the coast of Wilkes Land extends east and west for upward of seventeen hundred miles, and on the same parallel of latitude for nearly the whole way. Though broken by a series of bays and inlets, this coast presented such an appearance of continuity that Wilkes felt justified in declaring it to be the Antarctic Continent. It was exceedingly difficult to distinguish, through the almost perpetual mist and snow, whether the land sighted from time to time formed one coast broken by many headlands, bays and inlets, or was merely a long chain of islands, connected for the most part by walls of ice. The most eastern point, lying in latitude 67° S. and longitude 158° E., Wilkes named Ringgold's Knoll, in honour of the commanding officer of the *Porpoise*. The most western he called Knox's Highland. He wished to follow the coast, if possible, as far as Enderby Land, but he encountered such a mass of débris-laden icebergs that further progress was impossible. In longitude 97° 37′ E. he saw what he terms "an appearance of land," but he was compelled to turn northward and sail back to Sydney without making closer investigation, having given the apparition the benefit of the doubt and the name of Termination Land.

Section 4. All the time that Wilkes and Dumont D'Urville were cruising about the Southern Polar seas, preparations for the voyage of James Clark Ross had been steadily going on in England. The bomb vessels *Erebus* and *Terror* were most care-

fully equipped, externally and internally, for a three years' voyage in the most frozen and inhospitable regions on earth, and manned by crews of picked men inured to hardship and experienced in polar navigation. Ross himself assumed command of the *Erebus,* while the *Terror* was placed under Francis Crozier, the intrepid officer who, five years afterward, commanded the same ship in the gallant and ill-fated Franklin expedition. Nothing that forethought and experience could supply was omitted from this equipment, upon which was spared neither time nor money, and to its completeness is owing in no small degree the success of one of the most brilliant voyages of discovery ever made, and one to which the world of science owes most important additions to all branches of physiography.

Ross went south by way of Madeira, the Canary Islands, Cape Verde Islands, St. Paul's Rocks, Trinidad and St. Helena, stopping at each place to make magnetic observations which were repeated simultaneously at all the observatories in the world. At the Cape of Good Hope the expedition remained for nearly a month, establishing there a fixed magnetic observatory. Turning south again, by way of the Marion and Crozet Islands, Ross steered for Kerguelen Island and anchored in Christmas Harbour, where two months were occupied with magnetic observations.

At Hobart Town, in Tasmania, another permanent magnetic observatory was established, and Ross

was surprised and considerably annoyed to receive intelligence that his explorations in the region of the Magnetic South Pole had been anticipated by Wilkes and Dumont D'Urville. The former even sent him a chart of the "Antarctic Continent," which fact may have had something to do with the declaration made later by Ross that all Wilkes' discoveries were apocryphal. With true British pride, he promptly selected another route to the Pole, far to the east of that taken by the rival explorers, whose course he refused to follow.

Early in November, 1840, he left Tasmania, and, after pauses at some of the smaller islands for observations and experiments, he steered straight for the south, following the one hundred and seventieth meridian, the same on which Balleny had found the sea comparatively clear from ice as far as the sixty-ninth parallel. He had crossed the sixty-third parallel when the first iceberg came in sight, to be followed rapidly by others. The Antarctic Circle was crossed soon afterward, and the ships found themselves on the edge of the ice-pack. As it was drifting to the north, Ross pushed steadily through it, reaching the open sea at latitude 69° 15′ S. The expedition then turned to the southwest, hoping to approach the Magnetic Pole by sea, as Ross conjectured that the coast seen by Wilkes and D'Urville was no more than a chain of small islands.

A few days later a range of lofty, snow-covered mountains appeared, the first glimpse of them having

been obtained, by means of the refraction of light, at the extraordinary distance of one hundred nautical miles. The ships approached as near to the shore as the pack-ice would permit, and a closer survey was made of the mountain chain, which Ross named the Admiralty Range. It was the loftiest yet discovered in the Antarctic regions, the peaks ranging from 7,000 to 10,000 feet in height and being completely covered with ice and snow, while the ravines between were filled with enormous glaciers. The loftiest peak received the name of Mount Sabine, and the cape at its foot was called Cape Adare.

From this point the coast turned sharply to the south, and Ross followed its trend, hoping by this means to approach more closely the Magnetic Pole, which he had located by means of the magnetic dip in latitude 76° S. and longitude 145° 20′ E. He passed many small islands of volcanic origin, on one of which he landed, naming it Possession Island. A violent storm compelled the ships to stand out to sea, but the mountains were visible one hundred and forty miles away, the glittering icy heights glinting like jewels above the clouds. It was not long before still loftier elevations appeared in the southwest, and one, the highest peak yet discovered in the South Polar zone, received the name of Mount Melbourne.

Ross now sailed due south, crossing Weddell's highest latitude, and effected a landing on a small island just beyond the seventy-sixth parallel, to which he gave the name of Franklin Island. The

farther the ships advanced the more land came into view, until a nearer approach made clearly visible another chain of high mountains with cone-shaped summits, extending east and west across the horizon. One proved to be a volcano in active eruption, a most astonishing spectacle in these latitudes. Ross gave it the name of Mount Erebus, and estimated its height at 12,400 feet. Another volcanic peak, 10,000 feet in height and apparently extinct, lying just to the east, received the name of Mount Terror. Two promontories lying just below the two volcanoes were named, respectively, Cape Bird and Cape Crozier.

Extending from Mount Terror toward the east appeared a perpendicular cliff of ice, its top absolutely level and about two hundred feet above the sea, and with a smooth and fissureless façade. In height and conformation it resembled the cliffs of Dover, and its presence and position naturally compelled Ross to alter his southward course. He turned east and followed the trend of the great ice barrier, reaching the southernmost point attained during this voyage in latitude 78° 4′ S. and longitude 173° 20′ W. The eastward course was held to until the ships were so closely wedged in between the barrier and the pack-ice that they were extricated only with the greatest difficulty just as the expedition was within a hair's breadth of being frozen in for the winter.

Ross then steered toward the north, but violent snowstorms and the rapid formation of young ice in

the pack obstructed progress to such an extent that further battling with the pack-ice was felt to be useless, and Ross determined to make one more effort to reach the Magnetic Pole by sea, and then to seek a harbour available for winter quarters. He had come nearest the Pole at Franklin Island, and he had reason to hope that the pack-ice in that vicinity had drifted to the north. Accordingly, he turned once more in the direction of Mounts Erebus and Terror, hoping to find a harbour on the coast of the mainland which he had named Victoria Land, but the ice held him inexorably at a distance of ten or twelve miles from the shore. This was the more annoying, as at a considerable distance from the coast-line another mountain chain of great elevation was seen, evidently the connecting range between Mount Melbourne and Mount Erebus. Ross gave it the name of the Prince Albert Range and then reluctantly turned away.

It was high time, for the young ice all around them was neither strong enough to support a party of men to saw a way for the ships, nor thin enough to break through except under a strong breeze. They toiled along by dint of lowering the boats and rolling them over the ice to break it, and at last emerged into clear water and turned to the north, following the coast along the Admiralty Range toward the northwest. Ross closely examined the northern portion of Victoria Land, hoping still to find a harbour in which to winter. He reached the promontory called

Cape North, and there saw that the coast-line extended southwest, while another great ice barrier stretched off to the west. Still steering north, Ross sighted two islands which he named Russell Peak and Smith Island, and concerning which there is some doubt as to whether they were not the Balleny Islands. If not, the two groups lie fairly close together, and Ross, even had he been aware at the time of Balleny's discovery, could not approach within a distance that would allow accurate observation.

He then crossed the Antarctic Circle and turned west in order to approach the eastern end of Wilkes' "Antarctic Continent." The weather was clear and the sea visible for seventy miles around, but no land appeared, and, as the ships sailed over the very spot indicated as land in Wilkes' chart, Ross concluded that he and his men, being inexperienced in polar navigation, must have been deceived by the appearance of a bank of clouds beyond the ice-fields. Still persevering in his attempt to approach as closely as possible to the spot where the Magnetic South Pole was to be found, Ross pressed on toward the southwest until he reached the line of no variation in latitude 65° 10′ S. and longitude 144° 56′ E., after which he sailed back to Hobart Town to refit for next summer's voyage.

Section 5. Ships, provisions and equipment were found to be in excellent condition, and not a man was ill after a voyage full of hardships, but singu-

larly free from fatalities or casualties of any kind. Hobart Town was reached early in April, and from then until the last of November Ross was occupied with scientific investigations and observations in Tasmania, New Zealand and Australia, among others fixing at Hobart Town a permanent mark for showing the mean level of the ocean.

Late in November he started once more for the polar zone, steering due south after reaching meridian 146° W., in the hope of reaching the eastern point of the great ice barrier and renewing his explorations at the point where he left off the summer before. He hoped for rapid progress, but the ice-pack proved so heavy that for fifty-six days the ships had to be forced along inch by inch in the face of almost overwhelming difficulties, drifting north in the close grip of the ice while they struggled toward the south. Violent gales added to the perils and hardships that confronted them, and both ships suffered serious damages, which were repaired with almost incredible exertions as they lay among the ice. The width of the pack was estimated by Ross at one thousand nautical miles, and the amount of time consumed in working through it was appalling in the face of the short summer season, in which alone exploration in these regions was possible.

As the pack-edge trended toward the south, it was impossible to hold a due southerly course, but finally they succeeded in rounding the western extremity of the pack in latitude 75° 6′ S. and longi-

tude 172° 56′ E., and in turning toward the south-east, when they soon sighted the ice-barrier. The drifting ice prevented a close approach, but the débris-laden icebergs gave promise of the near neighbourhood of land. The cliff lay one minute to the south of the furthest point attained by the expedition, latitude 78° 10′ S. on longitude 161° 27′ W., with one exception the highest southern point that has ever been reached by man. Ross turned east along the face of the barrier, when he saw what appeared to be a snow-covered range of high mountains. As it was impossible to ascertain positively whether the peaks were mountains or icebergs, Ross charted them only as "an appearance of land," preferring to err on the side of conservatism.

Ross sailed north to the sixtieth parallel, deciding to keep along the line of it in voyaging toward Cape Horn and thence to the Falkland Islands, where he purposed to winter. He recrossed the Antarctic Circle on March 6th, after two months of the most arduous and heroic endeavour in the whole history of South Polar navigation. Both vessels were nearly wrecked by a collision with an iceberg just as all danger seemed to be past and Ross had ventured upon sailing all night to gain time. When daylight appeared it was seen that, by a most fortunate chance, they had succeeded in penetrating the only opening in a chain of icebergs that extended right across the horizon. They then pushed on to the Falkland Is-

lands, where their stay of eight months was utilized for the usual magnetic observations.

Section 6. On the 17th of December, 1842, the intrepid explorer once more turned his prows toward the south. For this third voyage, Ross had arranged an alternative plan. His first choice was to make for the southeastern continuation of Louis-Philippe Land in the hope of finding open water between the pack-ice and the coast, where he might be able to penetrate further to the south. Failing this, he purposed to follow Weddell's course, which lay to the east.

He steered first toward Clarence Island, and soon found himself once more in the grip of the ice-pack and surrounded by icebergs. Arriving at the east coast of Joinville Land, Ross there observed an especially large glacier, several miles broad, descending from the twin summits of a lofty mountain named by him Mount Percy, and ending at the sea in a perpendicular wall one hundred feet high, guarded in front by a great fleet of icebergs, the largest number ever seen together by the veteran polar explorer. A small volcanic island just off the coast he named Etna Islet, from its close resemblance to the celebrated volcano. A number of low, rocky islands to the south were aptly named the Danger Islets. The broad channel between Joinville Land and Louis-Philippe Land he called Erebus and Terror Bay.

Clear weather gave the voyagers an excellent view of the land, and of Mount Haddington, the highest

peak of this region. A steep island almost at its base Ross named Cockburn Island, and, landing upon it, he took formal possession by raising the British flag. It was especially interesting from the fact that Dr. Hooker, then assistant surgeon of the *Erebus* and afterwards the famous botanist, was able to collect nineteen species of plants on its rocky slopes. The investigation of these regions was made as thorough as possible, but could not be long continued on account of the rapid formation of young ice and the increasing pressure of the pack.

This grew so severe that the attempt to penetrate southward along the coast was finally relinquished, and Ross was forced to fall back on his alternative plan, that of following Weddell's course. He turned to the east, keeping along the edge of the pack, and then south until he reached a comparatively open sea. The highest point to which he penetrated was three degrees short of that attained by Weddell eighteen degrees farther west, but the advanced season and thickening ice made it imperatively necessary that he turn north, especially as he was harassed by violent storms. He crossed the Antarctic Circle for the last time on the 11th of March, 1843, and, having made a vain search for the Bouvet Islands, he returned to England by way of Rio de Janeiro, St Helena, and Ascension, with vessels and crew in sound and healthy condition, the only man missing being one who had fallen overboard in a gale off Cape Horn.

CHAPTER XXXI.

ANTARCTIC EXPLORATION OF RECENT YEARS.

Section 1. After the return of Ross from his expedition, interest in South Polar exploration languished once more. While yet his second voyage was in progress, an American seal-hunter, William G. Smiley, sailed completely around Palmer Land, thus settling the question as to whether or not that island was a continuation of Graham's Land. A year or two later the *Pagoda* was equipped and sent, under command of Lieut. Moore, to make magnetic observations in a region untouched by Ross, Wilkes or Dumont D'Urville, south of the sixtieth parallel of latitude and between meridians 0° and 100° E. longitude. Moore joined in the search for the vanishing islands discovered so long ago by Bouvet, but met with no better success than Cook or Ross. No discoveries of land were made, and the interest of the voyage remains purely scientific. It remained the last voyage to Antarctic seas for nearly twenty years, though a few discoveries and rediscoveries of islands were made in the region of the drift-ice.

The exertions of Georg Neumeyer, director of the

German Naval Observatory and an enthusiast on the subject of Antarctic exploration, finally succeeded in arousing a fresh burst of activity in the direction of making further voyages to those desolate seas, for the double purpose of scientific observation and land discovery. In 1873 Captain Dallmann was sent out by the German Society for Polar Navigation to make more accurate charts of the Dirk Gerritz Archipelago. He circumnavigated Trinity Land, proving its comparatively small extent, and discovered and named Bismarck Strait and the Kaiser Wilhelm Islands at its western extremity.

Section 2. Early in 1874, the *Challenger* was sent under the command of Sir George Nares, the eminent Arctic explorer, to cruise south of Kerguelen Island on a course recommended by Neumeyer, who had observed that the opening between Enderby Land, Kemp Land and Wilkes Land contained comparatively few icebergs, and who deduced from this the possibility of a warm current setting southward which might open a clearer passage to the Pole. The *Challenger's* mission was purely that of scientific research, and so thoroughly equipped was she with the best modern instruments that, though her justly celebrated cruise in Antarctic waters lasted only a few weeks, the staff of scientists accompanying her accomplished more in the way of results than all the other expeditions put together.

After a close investigation of Kerguelen Island and the Heard group, the *Challenger* sailed south for

deep-sea dredging in higher latitudes. No discoveries of new lands were made, but investigations of the highest scientific importance concerning the temperature, depth, salinity and sediment at the bottom of the sea, the minute forms of marine life, the formation of ice from the great glaciers of these regions, and the nature and size of icebergs. Artists accompanying the expedition gave most accurate and beautiful representations of the latter, some of which are floating plateaus eleven or twelve miles in extent either way. Some are castellated like the bergs of the north, but the majority, and all newly-formed bergs, are tabular in shape and most singularly and beautifully stratified with pure white, soft ice almost like snow, and hard, pure, brilliant ice of a deep cobalt blue.

Section 3. Ten years later, owing to the efforts of the Scottish whaling captains, John and David Gray, to arouse interest in the whale fisheries of the far southern seas, the Dundee Whale Fishing Company sent out four ships to search for the valuable whales reported by Ross to inhabit the seas to the east of Louis-Philippe Land. Two of the ships, the *Active* and the *Balena,* carried men and equipment for scientific research, and some valuable geographical surveys and meteorological observations were made, though the investigation was not as close as it would have been had it not been for the main object of the voyage. That was practically a failure, as whales had been all but exterminated in these waters by whaling steamers armed with harpoon guns.

About the time that the Dundee vessels set out, the Hamburg Oceana Association equipped the Norwegian whaling steamer *Jason,* with Captain Larsen as commander, for a voyage to the Antarctic waters. After convincing himself that the seas in the neighbourhood of the South Orkneys were unprofitable as regarded a yield of whalebone whales, Larsen, accompanied by the *Hertha,* under Captain Evensen, and the *Castor,* commanded by Captain Pedersen, turned toward the Dirk Gerritz Archipelago, hunting seals along the edge of the ice-pack. Finding none, Larsen steered to the southwest and soon passed through the belt of ice and fog into open water and clear weather in the western part of the Weddell Sea. Here, to the west, land was seen, which was named by Larsen King Oscar II. Land, and which was the hitherto unexplored northeast coast of the large peninsula known as Graham Land. To the north of King Oscar Land appeared a chain of volcanic islands which Larsen named the Seal Islands, two active volcanoes in the chain being called Christensen Volcano and Lindenberg Cone.

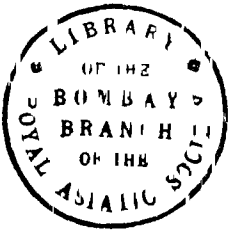
In the meantime, the *Hertha* had been cruising in the neighbourhood of the Biscoe Islands, where Captain Evensen found his whole course surprisingly free from ice. Although the voyage was not exactly a success from the whaler's point of view, valuable additions and emendations have been made to the charts of this portion of the Antarctic regions by the surveys and observations made from both vessels.

Section 4. In 1894, the steam-whaler *Antarctic* set out from Norway for the south. The object of her voyage was whale hunting pure and simple, but she had on board as a common sailor Carstens Egeborg Borchgrevingk, a young Norwegian naturalist. He had desired to ship as a passenger, but was not permitted, and his desire for South Polar exploration was so great that he shipped before the mast rather than lose the opportunity of reaching the Antarctic seas. After the usual cruising about among the icebergs and pack-ice in the region of Victoria Land, Borchgrevingk succeeded in landing on Possession Island, where he was rewarded by the discovery of a species of lichen, the most southern land plant yet discovered.

In 1897, the *Belgica* was sent to the south from Antwerp, under the command of Captain Adrien de Gerlache, who discovered and surveyed Belgica Straits, and who drifted for a year in the ice-pack west of Graham's Land. The expedition is noted as being the first to winter in the Antarctic zone. A year later, however, Borchgrevingk returned to high southern latitudes, and not only wintered at Cape Adare, but reached latitude 78° 50′ S., forty minutes beyond Cook's highest point, and the farthest southern point of earth yet attained by any explorer.

Section 5. The combined results of all these explorations in the Antarctic seas seem but meagre after the rich and varied record of toil, triumph, adventure and death that gives such vital human in-

terest to the story of the north. After the myth of a possibly habitable *Terra Australis* had been abolished, there was little in the South Polar zone to interest anyone but the geographer and natural scientist. In these days, both poles claim an equal degree of scientific value to the world, and in all probability the era of sustained research into the frozen mysteries that surround them has only just dawned.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Rockhill, William Woodville, 1888–89 journeys through Eastern Tibet, 428.
Rohlfs, Gerhard, 1861, explores Morocco and to Moroccan Sahara, 317; penetrates to Sus country, 358.
Rose, Gustav, mineralogist, accompanies Humboldt expedition in Western Asia, 378.
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Seetzen, Ulric Jasper, 1802-11, journeys in Syria, Palestine and Arabia, 360.
Selby, Lieut. W. B., 1842, surveys the Karun river, 383.
Semenoff, P., 1856, travels in Central Asia, 408.
Severtsof, N., 1864, discovers coal fields in Thian Shan mountains, 409.
Shaw, R. B., 1868, travels in Eastern Turkestan, 407.
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Smith, William, English whaling captain, 1819, discovers the South Shetland Islands, 483.
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